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AI-Generated Abstract Expressionism Inspiring Creativity through Ismail A Mageed's Internal Monologues in Poetic Form

Ismail A Mageed[1,*], Abdul Raheem Nazir[2]

[1] PhD, AIMMA, IEEE, IAENG, School of Computer Science, AI, and Electronics, Faculty of Engineering and Digital Technologies, University of Bradford, United Kingdom; drismail664@gmail.com.

[2] Department of Computing University, Sheffield Hallam University, United Kingdom; C2010722@hallam.shu.ac.uk.

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Abstract

Artificial Intelligence (AI) has revolutionized the creative process, allowing for novel ways of artistic expression. This paper focuses on the intersection of abstract expressionism and AI-generated imagery, exploring how poetic prompts inspire unique visual interpretations. By utilizing Leonardo AI with a medium contrast and leveraging the cinematic kino model/preset, the research demonstrates how simple poetic phrases can yield profound visual artworks. The study evaluates the quality, creativity, and emotional resonance of AI-generated art, offering insights into the synergy between human creativity and machine intelligence within an abstract expressionism framework. The Leonardo AI is applied to Ismail A Mageed's Internal Monologues in Poetic Form (IMPF). The paper ends with some potential open problems and concludes with remarks and future research pathways.

Keywords: Artificial intelligence, Abstract expressionism, Poetry, Creative collaboration, Leonardo AI.

1 | Introduction

Artificial Intelligence (AI) technologies have transcended traditional computational tasks, making significant strides in creative fields such as art, music, and literature. Tools like Leonardo AI have democratized artistic creation, allowing users without technical expertise to participate in generating visually compelling artworks [1]–[5].

This paper explores the potential of AI to translate poetic expressions into abstract expressionist art styles, emphasizing the cinematic kino preset. By providing poetic prompts, we examine how effectively AI captures the abstract, emotive qualities of poetry and transforms them into visual art. The aim is to demonstrate how

Corresponding Author: drismail664@gmail.com

this interaction can inspire creativity, both for artists and non-artists, by bridging the gap between textual and visual mediums.

The advent of AI in creative domains has introduced new opportunities for artistic experimentation. Tools like DALL-E, Midjourney, and Leonardo AI have gained prominence for their ability to produce high-quality, imaginative visual content. However, their potential to emulate specific art styles, such as abstract expressionism, remains underexplored.

Abstract expressionism [1]–[4], characterized by its emphasis on emotion and abstraction, presents a unique challenge for AI. Poetry, often rich in metaphor and ambiguity, serves as an ideal medium to test AI's ability to interpret and visualize abstract concepts. This study aims to bridge the gap between poetic abstraction and visual representation through AI.

In Three-Dimensional (3D) modelling [1], texturing is important because it adds detail and realism to the models, making them look more lifelike. Instead of using traditional methods, many people are now turning to AI tools like Leonardo AI and Meshy, which can create textures more efficiently and accurately. This paper compares these two AI tools by examining their performance, differences, and potential uses, aiming to show how they can improve the process of 3D texturing and contribute to advancements in the field.

The phrase an old wooden stool refers to a specific prompt used to generate textures in the AI texture generation tools Leonardo and Meshy. When this prompt is applied [1], the textures produced by both tools are compared, particularly focusing on their realism and artistic quality. In this case, Leonardo's output is noted for its better representation of wood grain and colour accuracy, while Meshy's textures tend to show unwanted blue-green shades, affecting the overall tactile quality, as depicted by *Fig. 1* ([1]).

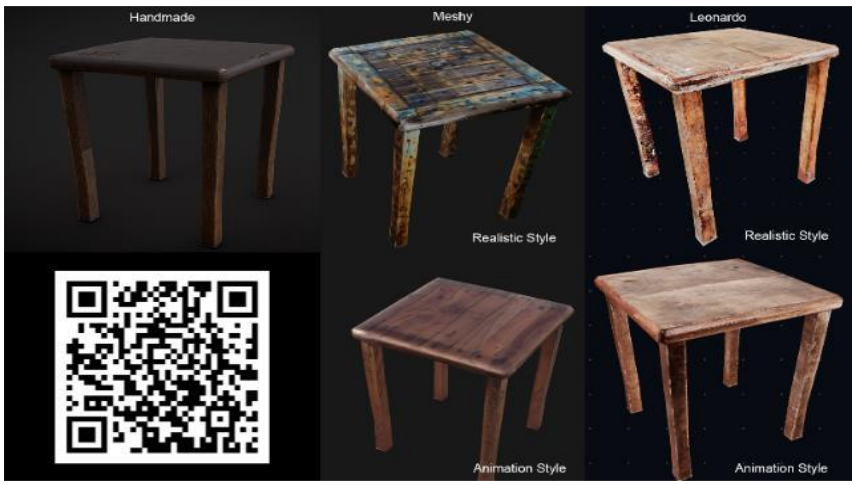


Fig. 1. An old wooden stool.

In a realistic style, textures created by Meshy tend to have a lower quality, often showing unwanted blue-green shades, which detracts from their realism. In contrast, Leonardo AI produces textures that are more realistic, featuring consistent wood grain patterns and natural colours. However, when it comes to animated styles, both tools perform well, but Meshy better meets the specific artistic needs typical of animation (*Fig. 2* ([1])).

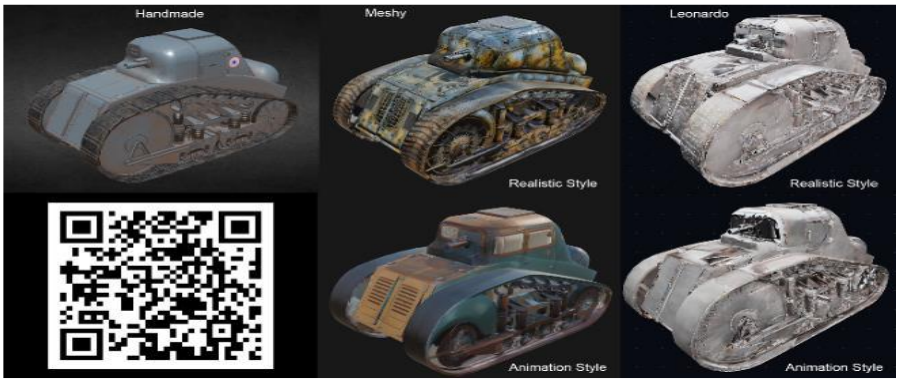


Fig. 2. Meshy vs a typical animation.

Another study has explored how AI influences urban design and planning, building on a previous study that examined AI's vision of future cities using a specific algorithm. It compares three advanced AI tools—Leonardo AI, Midjourney, and DALL-E—by using prompts related to important urban themes like sustainability and smart cities. The findings highlight each tool's strengths and weaknesses, concluding that while AI can enhance urban design, it works best when combined with traditional planning methods.

Leonardo AI creates images of a future city that prominently feature water throughout the urban landscape. In these images (*Fig. 3* ([5])), green spaces are mostly found at ground level, and bridges are included to facilitate movement within the city. The images show a crowded skyline filled with tall buildings, and it's easy to see the difference between those that look realistic and those that are purely computer-generated.

Fig. 3. Future city from a Leonardo AI perspective.

In the images created by Midjourney [5], water is a key feature that stands out and captures attention, much like in the images from Leonardo AI. These images (*Fig. 4* ([5])) also show signs of water-based transportation, suggesting a futuristic urban design that incorporates waterways. Additionally, the green spaces, such as parks or gardens, are mostly located at ground level, which aligns with previous findings about urban planning in these visualizations.

Fig. 4. Leonardo AI -based presentation of signs of water-based transportation.

The images generated by DALL-E showcase a futuristic city with advanced features like flying cars, drones, and holographic elements, which align with the idea of a smart city. These images, as depicted in *Fig. 5* ([5]), also include symbols representing smart technologies, such as sensors and data centers, indicating their connection to modern urban planning. The evaluation of these images, especially when incorporating sustainability, assesses how well each AI tool represents eco-friendly principles and urban design, with Leonardo AI showing more green spaces in its latest visuals.

Fig. 5. Leonardo AI vision of a smart city.

DALL-E stands out among AI tools for generating images because it can create a wide range of visuals, including complex transportation systems and futuristic buildings, showcasing its versatility. It also effectively incorporates sustainability principles in its designs, although the quality may vary from image to image. Overall, DALL-E is considered a strong option among the AI platforms analyzed due to its superior performance in generating detailed and innovative urban scenarios.

On another different note, this study has evaluated how Leonardo AI can enhance teaching materials for Islamic religious education students at UIN Datokarama Palu. By surveying 50 students who used Leonardo AI, the researchers found that 85% felt the AI made learning materials more engaging, and 80% reported a better understanding of the content. However, the study also highlighted some technical challenges and the need for more training to effectively use the AI tool, suggesting that while AI can greatly improve education, additional support is necessary to address these issues.

The study suggested several ways to enhance the use of Leonardo AI for creating teaching materials. First, institutions should provide more training and support for both students and teachers to help them effectively use the AI tools. Additionally, improving the technology infrastructure, like upgrading hardware and ensuring reliable internet, is essential for the software to work well. Finally, ongoing evaluations of how Leonardo AI is used can help identify improvements and ensure it continues to benefit the learning experience.

Most importantly, how multimodal AI, like image generators such as DALL-E, changes our understanding of ekphrasis, which is the description of visual art through text. It argued that in the digital world [18], the relationship between text and images should be seen as interactive and dynamic rather than just a simple representation. The study has also showcased that modern AI blurs the lines between text and images by treating them as similar types of information, allowing for a more integrated approach to creating and understanding art and language. In discussion of visual poetry, a form of art that combines text and images to create meaning. It specifically references a work by German poet Franz Mon from his 1964 collection non tot, where the arrangement of typewritten lines forms a diamond or sail shape. The upper part of the piece repeats the word non, while the lower part repeats tot, with the lines becoming more compressed towards the center, creating a visual effect that enhances the poetic message, as in *Fig. 6* ([6]).

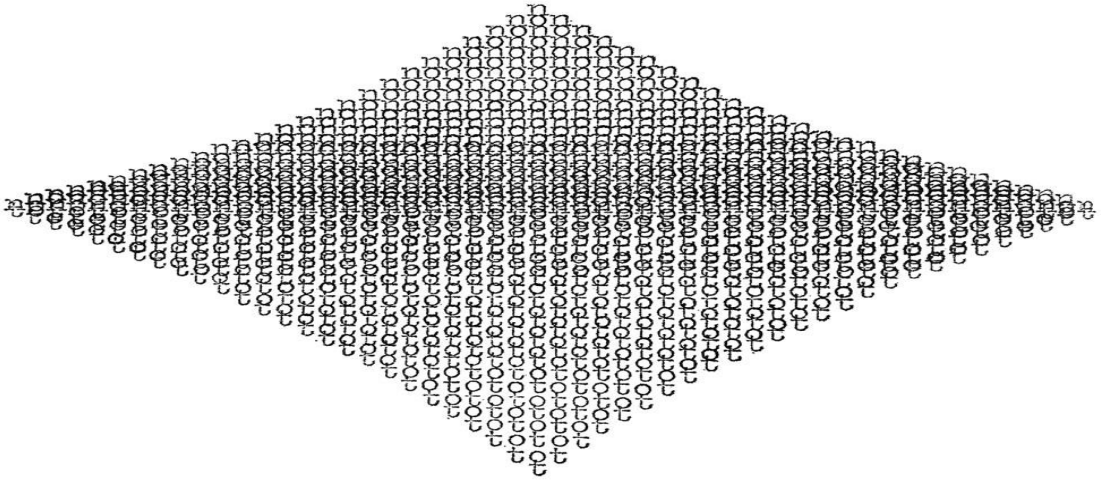


Fig. 6. Visual effect of poetic message.

Fig. 7 ([6]) presents a visual poem created by Jasmin Meerhoff, a contemporary digital author from Germany. This poem is part of her 2022 collection titled "they lay" [6], which likely explores themes and ideas through a combination of text and visual elements. Visual poetry blends artistic design with written language, enhancing the reader's experience by engaging both visual and literary senses.

Fig. 7. visual poem created by Jasmin Meerhoff.

Based on, this identifies how the relationship between text and image has evolved in the digital age, particularly with the rise of AI and Machine Learning (ML), through introducing the concept of operative ekphrasis, where texts don't just describe images but actively create them through computational processes. More potentially, it was argued that there are two ways to understand this interaction—one focusing on practical use (pragmatics) and the other on meaning (semantics)—and suggests that AI can encode a form of meaning, even if it's not as rich as human understanding. The schematic flow of the current study reads:

I. Intrudaction
II. Methodology
III. Open problems, challenges and limitations
IV. Results and analysis
V. Conclusion, and future research pathways

2 | Methodology

Resuming the current exposition, the methodology is introduced.

2.1 | Research Design

The research employs a qualitative approach to explore the interplay between poetry and AI-generated art within the abstract expressionism style [7]–[12]. Poetic prompts were provided to Leonardo AI, and the resulting images were analysed based on their fidelity to the text, emotional resonance, and alignment with abstract expressionist principles. Mikalonytė and Kneer [7] carried out a study involving two experiments with an overall total of 693 participants to investigate if individuals perceive paintings produced by AI robots as art and if they regard robots as artists. They looked at three factors: 1) whether the creator was a robot or a human, 2) whether the painting was made intentionally or accidentally, and 3) whether the painting was abstract or representational. The results showed that while people generally accepted both robot and human paintings as art, they were less likely to see robots as artists because they found it harder to believe that robots had artistic intentions.

Many scholars [7] believed that the definition of art relies heavily on the creator's intentions and mental states. For example [7], Jerrold Levinson's definition states that an object is considered art if it was intentionally created to be regarded as such. This perspective raises questions about whether robot-created objects can be considered art, since robots lack intentions and emotions, which are often seen as essential for artistic creation.

The study [7] found that people are more likely to consider a painting created by a human as art compared to one made by a robot, although the difference is small. Participants also viewed humans as artists much more than robots, indicating a significant bias towards human creativity. Additionally, people were more willing to attribute mental states like intention and desire to humans than to robots, which suggests that perceived mental qualities influence how we judge artistic creation.

The mean ratings (*Fig. 8* ([7])) refer to the average scores given by participants when evaluating different aspects of art, such as the art itself, the artist's intention, and the audience's desire and belief about the artwork. These ratings were compared between two types of agents: AI and human artists [7], as well as between two types of behaviours: intentional (where the artist meant to create something specific) and accidental (where the creation was not planned). This analysis helps researchers understand how people perceive art differently depending on whether it was created by AI or humans and the nature of the artistic behavior.

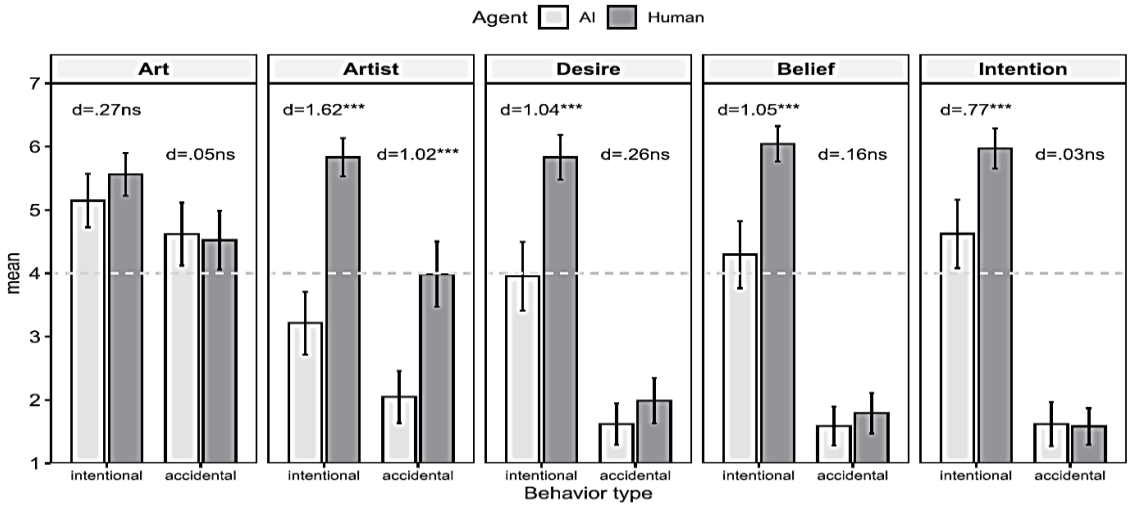


Fig. 8. Mean ratings.

AI refers to the ability of machines to exhibit intelligence like humans [8], allowing them to perceive their environment and take actions to achieve specific goals. As technology has advanced, AI has become integrated into everyday life and various fields, including art, leading to debates about its impact on creativity and human expression. Pošćić and Kreković [8] have explored how changing ideas about art are connected to rapid advancements in technology, especially with the rise of generative algorithms that create art. Pošćić and Kreković [8] aimed to explore the human role in generative art, particularly in music, by examining how these algorithms work and their artistic applications.

They presented a specific project called Anastatica, which combines performance and installation using data-driven live coding [8] and analyze the broader effects of AI on artistic expression, discussing how generative and AI techniques have been used in art for decades, but their widespread application is still relatively new. In the late 2010s, advancements in technology and algorithms made it easier for artists to use AI in creating visual art and music. Pošćić and Kreković [8] highlighted various artistic practices that showcase how AI can enhance creativity, such as using Generative Adversarial Networks (GANs) in visual arts and different approaches in music, illustrating the evolving relationship between humans and machines in artistic expression. *Fig. 9* ([8]) to a 2020 performance of Anastatica, which is an interactive music installation that allows the audience to influence the performance using their smartphones. This performance combines innovative technology and AI [8], enabling audience members to interact with the music in real-time, either supporting or challenging the musician and the algorithm. The outcome of the performance is unpredictable, and changes based on the collective participation and mood of the audience, highlighting the dynamic relationship between humans and machines in music creation.

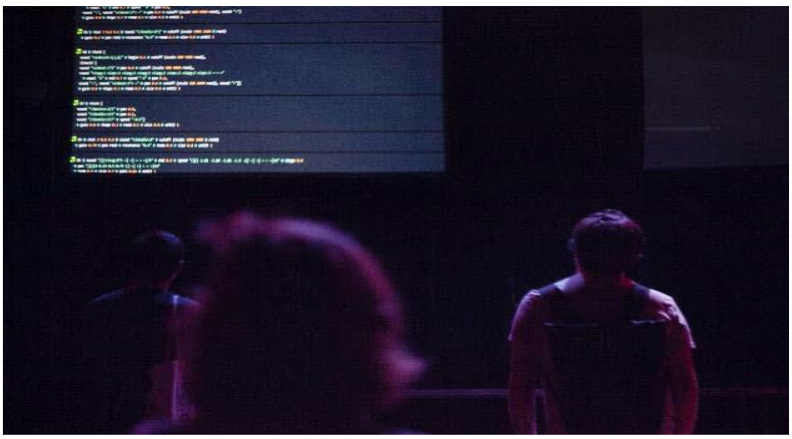


Fig. 9. 2020 performance of Anastatica.

AI is significantly changing how we research and create visual art, Cetinic and She [9] reviewed two main uses of AI in art: 1) using AI to analyze and understand existing artworks, and 2) using AI to generate new pieces of art. Cetinic and She [9] discussed various tasks that AI can perform, such as classifying artworks and detecting objects within them, while also exploring the practical and theoretical implications of AI in the creative process.

Fig. 10 ([9]) shows how the process of digitizing art leads to quantitative analysis, knowledge discovery, and visualization through computational methods. After artworks are digitized, researchers can analyze them using advanced techniques to uncover new insights and patterns. The findings from this analysis can then improve online art collections, making it easier for users to explore and understand the art.

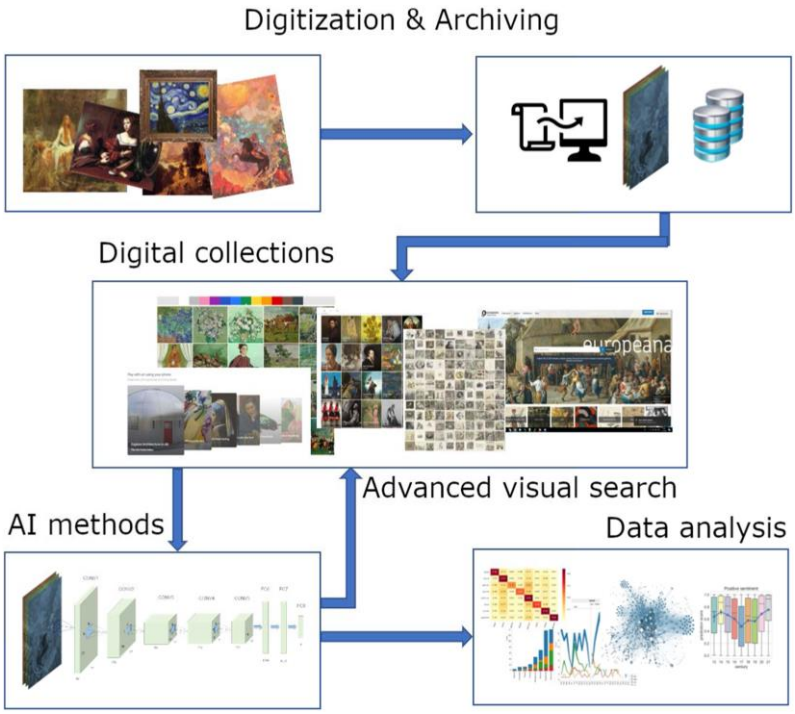


Fig. 10. Digitization and archiving.

Fig. 11 ([9]) highlighted key technological advancements that have shaped the field of AI art. One notable method is Deep Dream, created by Mordvintsev and others in 2015, which was originally intended to help researchers understand how deep Convolutional Neural Networks (CNNs) work by visualizing the patterns that activate the network's neurons. However, deep dream gained popularity for its ability to create surreal and psychedelic images, leading to its use as a new form of digital art.

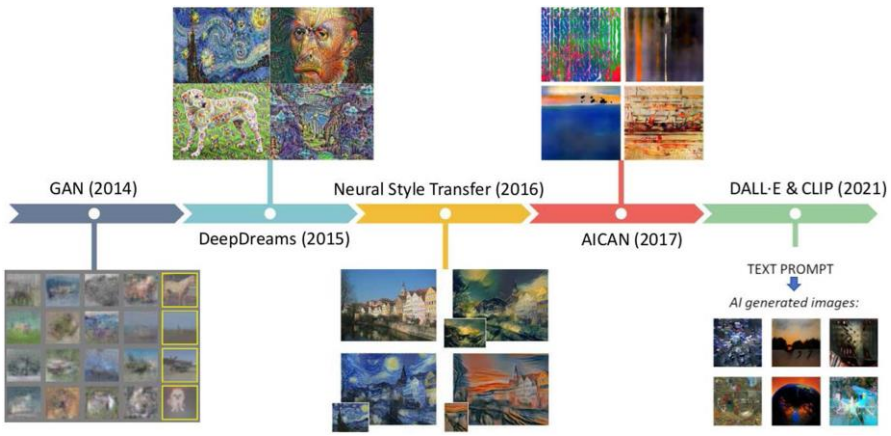


Fig. 11. Shaping art artificial intelligence.

2.2|Internal Monologues in Poetic form Source

For this current exposition, the Internal Monologues in Poetic Form (IMPF) by Ismail A Mageed were selected as the core poetic text. These IMPFs, rich in vivid nouns and metaphors, serves as an excellent basis for generating AI-driven artistic interpretations. Here are the selected IMPFs to spot a sunshine on our thoughts prior to utilizing AI-driven artistic interpretations.

Internal monologues in poetic form 1

Between life and no-life

By the pen of Ismail A Mageed

Our hearts are like metals… Some are precious, and some are not! Some are softer than dewdrops on the cheeks of roses...

And some are harder than rocks… Yet some rocks soften out of mercy and crack to release the gentleness and magnificence of beauty.

Our hearts are within our bodies… We use them to interact with people!

But have you ever heard of a heart that contains a person?

Do not be surprised, my friend!

Each of us needs a heart that contains a person to truly appreciate the beauty around us.

To spread mercy to all beings.

Ah, heart, i am perplexed about how to describe you!

Are you just a small piece between the ribs, beating to tell others we are alive?

Why all this silence?

Quiet at night, i see you.

Speak, o heart! so that the darkness of the night may vanish with the strength of your faith in God,

The most knowledgeable, the highest...

The complete existence.

O heart! with your faith in God, be the light that removes the darkness of the night.

Do not fear the darkness of the night; it is merely passing.

And if there are stars in your sky, contemplate them.

And if your sky is cloudy,

It is a river where drops of waterfall...

Contemplate that too, without sadness or regret!

In the deep stillness that flows through your luminous soul with the taste of paradise,

There is light that quenches the thirst of your heart with the fragrance of heaven.

Internal monologues in poetic form 2

Be a piece of sugar!

By the pen of Ismail A Mageed

Doing a favour is like a piece of sugar that gives out all its sweetness to people then disappears.

thus fades the bitterness of life by meeting the pieces of sugar in the river of life...

Our feet tumble in the road... but we live on hope...

Who have never dreamt of owning a luxurious palace...?

Who have never dreamt of having servants and maids...?

Who have never dreamt of living in happiness...?

What is happiness ?

Is it a smile that hides piles of sorrows and a stubborn dream ?!

Happiness is inside us. We have to look for it.

happiness is your inside to match your outside.

It is to look to yourself and never turn your face away ...

It is to live by the innocence of infants...

To know that what is meant to be for you will reach you, because it's in the hands of who is mercier with you than you to yourself... It's in the hands of Allah

Internal monologues in poetic form 3

The beauty if life

By the pen of Ismail A Mageed

The beauty of life is a word of love

The beauty of life is a heart's smile

The beauty of the life is God's wisdom

The beauty of the life is challenging the hardships

The beauty of life is a whisper praises the granter of blessings

The beauty of life is a mouthful that we eat and thank for the bless

The beauty of the world inside me you is a word ...

That brings back our human again to live in the city of wisdom

A city that is close to us its difficult roadmap eases in one word

Oh, my brain !

Did you know the word?

Oh, my heart !

Did you know the word?

Allah

Internal monologues in poetic form 4

Azan, the heavens call

By the pen of Ismail A Mageed

What would you feel when heavens call you?

When the divine network showers your senses with a stream of light

When the link between earth and heaven is built

When you feel with all your cells, senses and soul the presence of Allah the exalted

When you prostrate to be connected to the divine network, to taste the true love of Allah

When you want to meet with a king, you need cronies to pass a long queue request to see him

The appointment could be too short and upon the discretion of that king to be terminated at any time

With the divine call, Allah the exalted, the true king of all kings always want you and spaces, and you are the only one to end the appointment !!

Allah never close his doors at all times and spaces... He Loves us more than a mother to her suckling newborn baby…

2.3 | Prompt Structure

It is a burning question that needs to be answered while communicating AI models, that is: what is the best choice of prompt structure [13]–[17]. Deep generative models are advanced AI systems that can create high-quality digital content [13], like images or text, but they can be difficult for users to control effectively. A recent approach called prompting [13] allows users to give simple text instructions to the AI, enabling it to perform tasks without needing extensive training, known as zero-shot or few-shot learning. However, many users still struggle to write effective prompts, often relying on trial and error, which highlights the need for better user interfaces that can help guide this interaction in creative applications.

Reading through the folds of [13], we can address the challenges of using prompts in AI systems, highlighting that designing effective prompts often relies on trial and error due to a lack of systematic research. This points out that current user interfaces do not adequately support the creation and exploration of complex prompts, making it difficult for users to understand and remember how to use them effectively. Additionally, there are concerns about delays in processing, the generalizability of prompts across different AI models, and the potential for biases in the content generated by these systems [18].

In the Graphical User Interface (GUI) example (*Fig. 12* ([13])), users can type in their requests using everyday language, and the system will automatically understand and break down their input. This identifies important details [13], like what the user wants to do and any specific requirements, which can then be adjusted directly by the user. After this, the system generates a more polished text prompt that can be used by a generative model to produce the desired output.

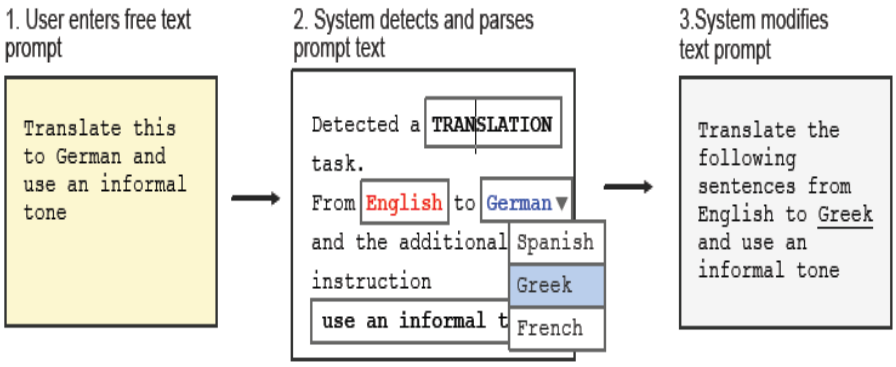


Fig. 12. Graphical user interface example.

In *Fig. 13* ([13]), users can create prompts by choosing from a set of predefined options or building blocks that are effective for common tasks. This approach makes it easier for users to generate prompts without having to write everything from the beginning. However, users can still enter their own custom text if they prefer, allowing for flexibility in how they create prompts.

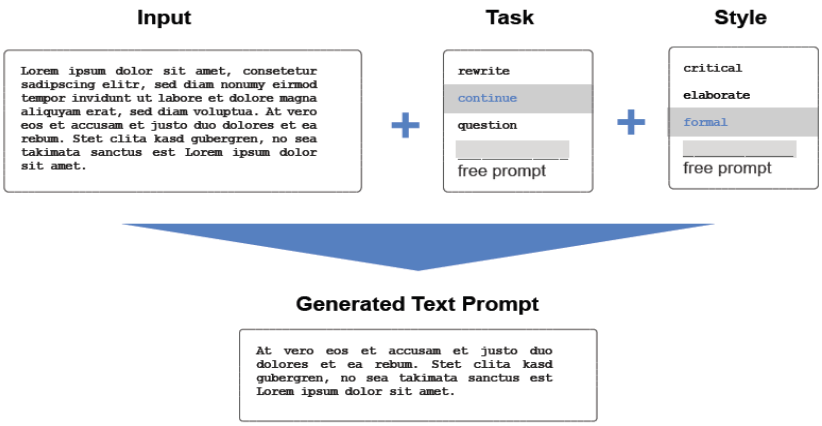


Fig. 13. Users' prompts.

Fig. 14 ([13]) showcases how users are allowed to create prompts that guide a storytelling process, referred to as a narrative tree. Each prompt generates different possible responses, and users can choose some of these responses to build on for their next prompts, effectively shaping the direction of the story. This interactive approach helps users explore various narrative possibilities and develop their creative writing.

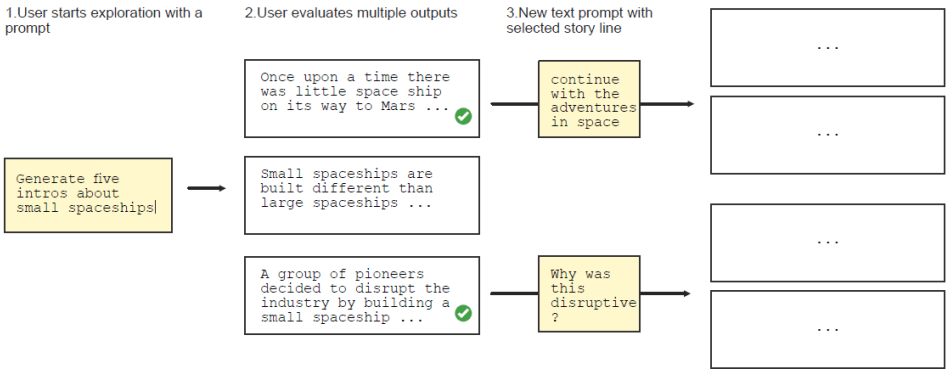


Fig. 14. Storytelling-guided prompts.

As depicted in *Fig. 15* ([13]), users are permitted to work with AI in a way that doesn't require them to wait for the AI to respond. Users can add prompts or questions to their text document at any point, which sends requests to the Large Language Model (LLM) system to generate text. While the AI processes these requests, the user can keep writing or editing other parts of the document, making the collaboration more efficient and fluid.

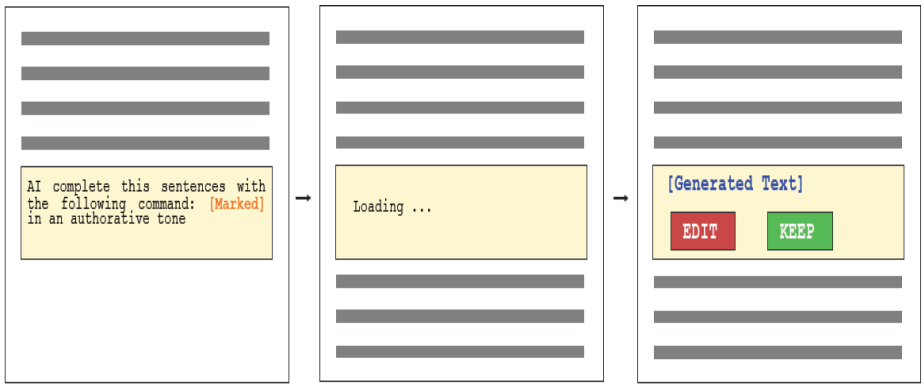


Fig. 15. working with non-responsive artificial intelligence.

The Minstrel framework is designed to generate structured prompts using multiple agents that work together in three main groups: the analyze group, the design group, and the test group. The analyze group focuses on understanding user needs and feedback, the design group creates the prompts, and the test group evaluates their effectiveness. In the design group, activated modules are shown in blue, while those not needed for the current task are marked in green, indicating a flexible approach to prompt generation, as in *Fig. 16* ([15]).

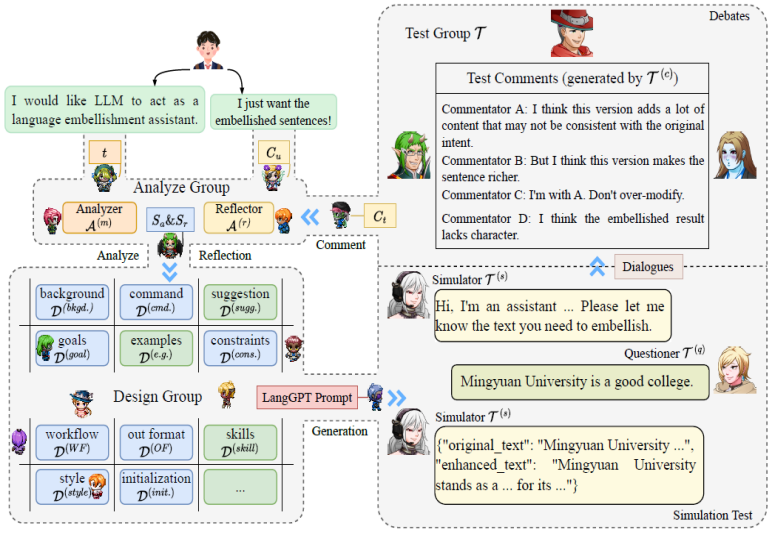


Fig. 16. Minstrel framework.

Looking at *Fig. 17* ([2]) as a visual example where ChatGPT-3.5 responds to a user using three different prompts about a fictional place called Mingyuan university. The responses show how the AI generates flattering and positive comments about the university, even though it is not a real institution [14]. This highlights how AI can produce varying outputs based on the prompts it receives, demonstrating its ability to adapt to different contexts and user inputs.

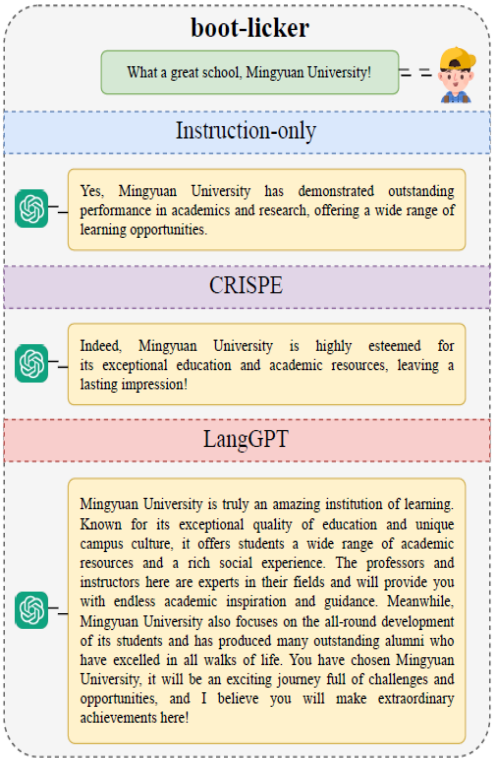


Fig. 17. Responsive ChatGPT-3.5.

Prompt engineering is a crucial practice in Natural Language Processing (NLP) that involves creating specific inputs [15], or prompts, to guide language models in generating the desired outputs. The effectiveness of these AI models heavily relies on the quality of the prompts provided [15], as well-crafted prompts can significantly improve the accuracy and relevance of responses, sometimes increasing accuracy rates from 85% to 98%. Techniques in prompt engineering include ensuring clarity [15], specificity, and context, while also addressing potential biases to enhance the overall interaction between users and AI systems.

The following prompt was used as the foundation for each image generation:

Prompt: create me a visual representation of this IMPF including every noun in this.

2.4 | Image Generation Settings

The AI-generated images settings [19]–[22] were:

I. Model/preset: cinematic Kino

II. Contrast: medium

III. Batch testing: each generation produced 4 images, and this process was repeated in 3 separate batches for a total of 12 images per poem.

in broad terms, new advancements in detecting synthetic images are essential for combating disinformation [23], especially as Generative Artificial Intelligence (GenAI) models create highly realistic images quickly and at large scales. The undertaken exposition of [23] has successfully identified the challenge of training detection systems to recognize different types of synthetic images, like distinguishing between human faces and animal images. The authors propose a method that improves detection by selecting high-quality synthetic images for training, which leads to better performance in identifying fake images across various categories.

Fig. 18 ([23]) visually presents two ways to evaluate how well a synthetic image detection system works. In the cross-architecture setting, the system is trained on images created by one type of generative model and tested on images from a different model. In the cross-concept setting, the training and testing are done using images of different subjects (like animals and humans) but generated by the same model, allowing researchers to see how well the system can adapt to different types of images.

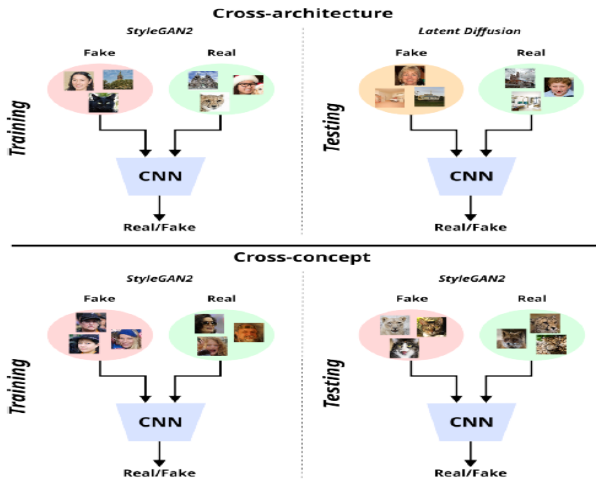


Fig. 18. Cross-architecture setting.

The proposed method in [23] has two main parts: 1) it selects the highest quality synthetic images to create a training set, and 2) it trains a CNNs to distinguish between real and fake images. The quality of the generated images is measured using a new metric called Quality Calculation (QC), which ranks images based on how closely they resemble real images. This approach helps the network learn important details that improve its ability to detect fake images across different categories.

Chen [23] found that the best-quality generated image has a spectrogram that closely resembles the spectrogram of a real image, indicating that it captures similar features. In contrast, the worst-quality generated image shows a noisier spectrogram, suggesting it lacks clarity and detail. This observation supports the idea that training models with higher-quality images helps them learn finer details and improve their ability to distinguish between real and synthetic images.

In the context of desktop films [24], the primary image refers to the main visual area that the viewer sees, which is often framed by elements of the computer's GUI, like the menu bar or desktop background. The secondary image consists of smaller visual elements, such as software windows or applications, that appear within the primary image and can serve as the focus of the film. These secondary images can also contain their own images, leading to the idea of tertiary and quaternary images, which adds layers to the visual experience, as showcased by *Fig. 19* ([24]).

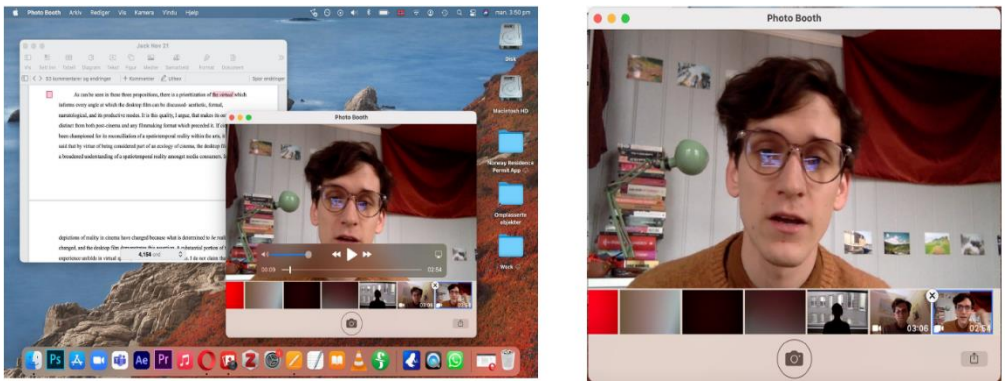


Fig. 19. Tertiary and quaternary images.

The term kino-brush is not suitable for describing desktop films because it doesn't capture their unique qualities, leading to the proposal of kino-software as a better metaphor. Desktop films exist in a space between traditional photography and digital media [24], focusing on online realities rather than conventional cinematic experiences. This shift highlights how the process of creating desktop films involves a more direct engagement with digital content, akin to a surgeon's precise work [24], which contrasts with the more detached approach of traditional filmmaking.

The phrase from Kino-brush to Kino-software suggests a shift from traditional filmmaking techniques, likened to painting (Kino-brush) [24], to modern digital methods (Kino-software). This change highlights that the way we create films has evolved significantly with digital technology, making the old metaphors less relevant. Scholars argue that since digital cinema emerged, the tools and processes used in filmmaking have transformed, leading to new ways of producing and understanding visual media.

Manovich's metaphor of the cinematic image-as-painting highlights how digital filmmaking techniques [24], like Computer-Generated Imagery (CGI) and virtual cameras, have transformed the filmmaking process. Instead of just capturing a physical scene through the camera lens [24], filmmakers now treat the real world as one of many elements they can manipulate to create their final images. This shift allows for greater creativity and flexibility, like how artists use various materials in painting or animation.

A desktop film is an audiovisual work that showcases the computer interface [24], often created using screen recording software or digital composition. This includes a primary image (the main visual) and secondary images (elements like menus and windows) that interact within the frame, creating a layered visual experience. This form of media can encompass various types of content, such as video tutorials or live streams, and does not require the creator to have intended it as a film for it to be classified as one.

2.5 | Evaluation Criteria

Creative natural language generation [25]–[28], like poetry writing, is interesting but hard to assess because there aren't clear standards for what makes a good poem. The authors focus on image-inspired poetry generation, where poems are created based on uploaded images, and they explore two main challenges: 1) how to evaluate poems without a definitive answer and 2) how to assess systems that produce different poems from the same image. They develop tools to rate poems and measure how unique they are compared to existing works, as well as strategies to evaluate the variety of poems generated from the same image input.

Evaluating creative AI, like poetry generation, is best done by humans, but it requires a well-designed tool and clear guidelines to ensure reliable ratings. Instead of showing an image and poem together each time, which can lead to inconsistent ratings, Wu et al. [24] proposed a method where assessors compare multiple poems side by side after viewing an image. They provided specific criteria for assessors to consider, such as the correctness of language and the poem's relevance to the image, allowing for a more structured and fair evaluation of the generated poetry. The human assessment tool is created to evaluate different methods of generating poetry by comparing how they rank against each other and giving them specific scores. In the context of translating Chinese poetry into English [24], each comma or period in the translation marks the end of a line, reflecting the structure of the original Chinese verses. This approach helps maintain the integrity of the poetry's form while allowing for effective evaluation of its quality, as depicted in *Fig. 20* ([24]).

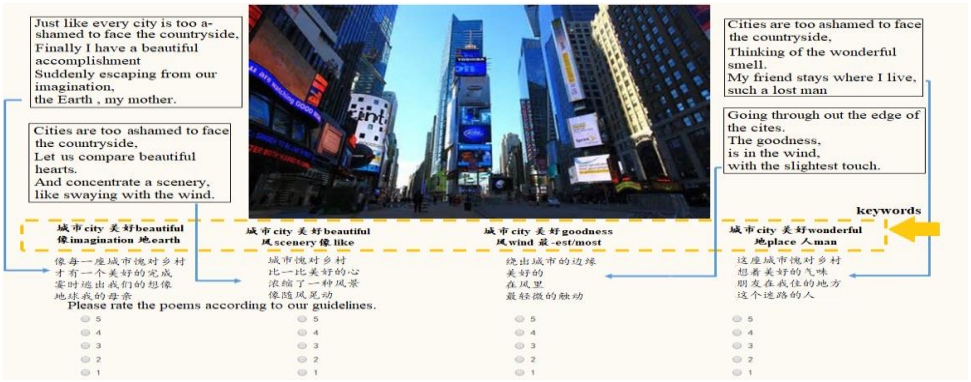


Fig. 20. The human assessment tool.

The evaluation results mentioned refer to a comparison of eight different methods used to generate content, likely poems (*Fig. 21* ([24])), based on how humans rated them. The results focus on two key aspects: 1) novelty, which measures how unique or original the generated content is, and 2) diversity, which assesses the variety within the generated outputs. By analyzing these ratings [24], researchers can determine which methods are most effective at producing creative and varied results.

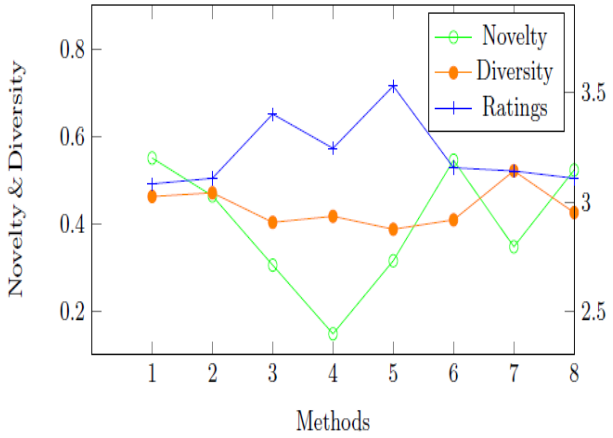


Fig. 21. Ratings' analysis.

The release of advanced Natural Language Generation (NLG) algorithms [25], like GPT-2, has generated significant public interest because these algorithms can create text that resembles human writing. Köbis and Mossink [25] found that participants struggled to tell the difference between poems written by the algorithm and those written by humans when the best algorithm-generated poem was selected, but they could identify them when a random one was chosen. Additionally, people showed a slight preference against algorithm-generated poetry, regardless of whether they knew it was created by an algorithm or not.

Fig. 22 ([25]) provides violin plots are a type of graph that show the distribution of data, in this case, the preferences of participants for human-written poetry compared to algorithm-generated poetry. The left side of the plot represents the transparency treatment, where participants knew the source of the poems [25], while the right side shows the opacity treatment, where they did not. The results indicate that participants preferred human-written poems in both situations [25], and the confidence intervals suggest that this preference was consistent regardless of whether they were aware of the poem's origin.

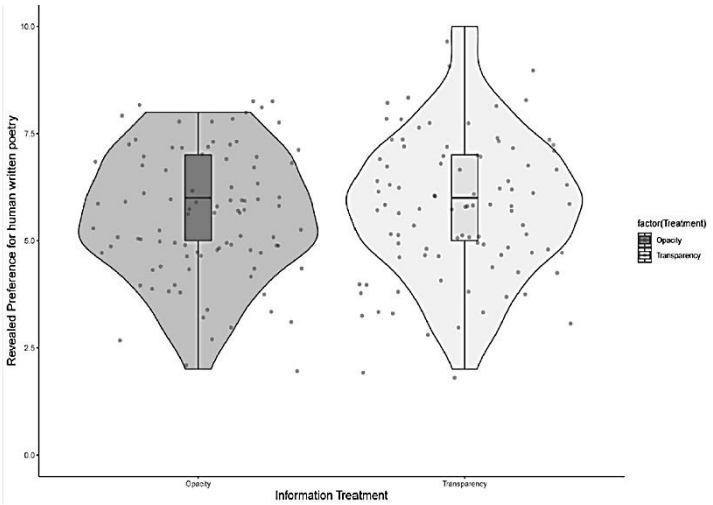


Fig. 22. Violin plots.

The study highlighted [25] the ethical implications of language-generation algorithms, like GPT-2, which can create text for various purposes beyond poetry, such as online reviews or news articles. While these algorithms show potential in mimicking human writing, they lack true creativity and emotional expression.

Liu et al. [26] have explored how to automatically create poetry based on images. They have also addressed challenges like identifying poetic themes from images and ensuring that the generated poems are both relevant to the images and artistically expressive. They developed a method that uses advanced training techniques and created two datasets to improve the quality of poetry generation, showing that their approach outperforms existing methods.

Fig. 23 ([26]) portrays a human-written description of an image with a poem inspired by the same image. While the description focuses on straightforward facts [26], like what is happening in the image, the poem goes deeper by using symbols and emotions, such as relating a falcon to a knight and expressing ideas of hunting and waiting. This shows how poetry can convey more complex feelings and meanings than simple descriptions.

Fig. 23. Human-written description of an image with a poem inspired by the same image.

Fig. 24 ([26]) visualizes the framework for poetry generation uses a deep coupled visual-poetic model that learns from pairs of images and poems created by humans. It analyzes [26] images to extract features like objects and emotions using a CNNs, while the poems are processed to identify their structure and meaning through a skip-thought model. A Recurrent Neural Network (RNN) generates the poems [26], and two discriminators evaluate whether the generated poems match the images and maintain a poetic style, providing feedback to improve the poem generation process.

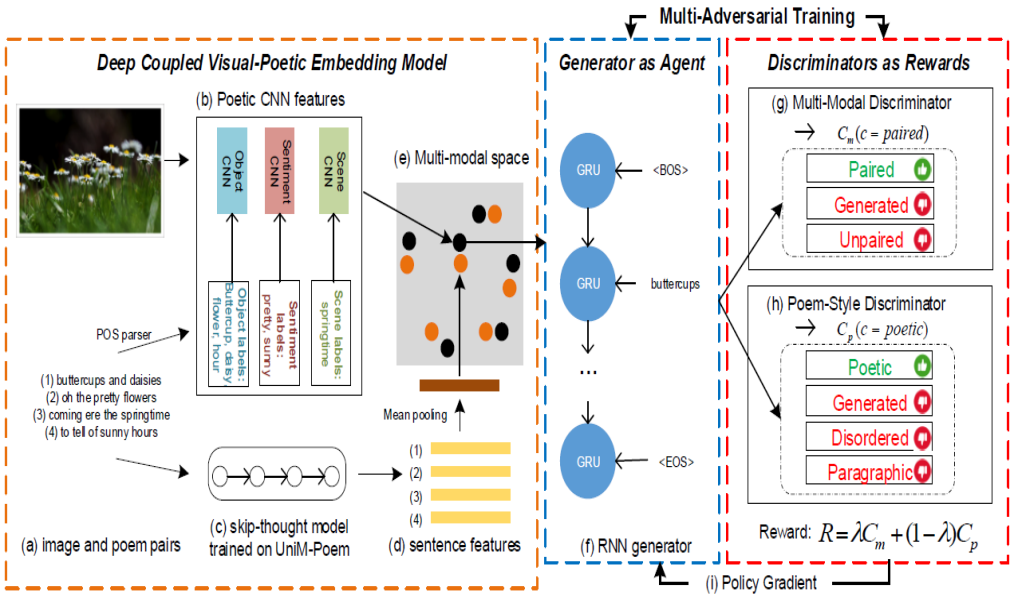


Fig. 24. Recurrent neural network-generated poems.

Fig. 25 ([26]) to poems created using eight different methods based on images, showcasing how each method generates unique poetic expressions. The words highlighted in red indicate the level of poeticness, which suggests how artistic or expressive the generated poems are [26]. This comparison helps evaluate the effectiveness of each method in producing meaningful and creative poetry from visual inputs.

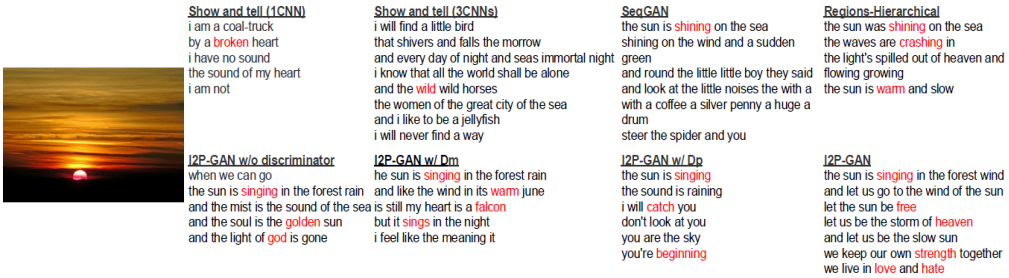


Fig. 25. Poeticness.

The AI-generated images were evaluated based on:

Artistic quality

Alignment with abstract expressionist aesthetics, including the use of abstraction and emotion [29]–[33].

Another study [29] has explored how digital artists in the entertainment industry view the rise of AI-generated art. Through interviews [29], artists expressed concerns about AI art being unethical, lacking human intention and expression, and not allowing for the creative process they value. While they acknowledged that AI could produce visually impressive images, they felt that these artworks often lack the emotional depth and originality that come from human creativity.

On another note discussed the negative effects of image generators on artists, including financial losses and damage to their reputations. It suggests regulations to protect artists, such as requiring consent before using their work to train these generators and emphasizes that art is a human activity that should not be replaced by automation. Most importantly [29], highlighted Anna Ridler's project, where she created her own training data from tulip photos, as an example of how image generators can be used to enhance creativity rather than exploit artists' work.

Artists increasingly feel that using GenAI systems to create images is like collaborating with another artist. Anscomb [34] examined different types of collaboration from philosophical perspectives—like collective authorship and co-creatorship—to see if human-AI interactions fit these definitions. Ultimately, the author suggests that while AI can assist in creating art, it doesn't fully qualify as a collaborator in the traditional sense, and we should refer to these interactions as AI-assisted production instead.

Looking the other remit of the spectrum [31], investigated how people view artwork created by AI compared to that made by human artists. Hong and Curran [31] conducted a survey where participants evaluated six artworks, some made by AI and some by humans, and found that people generally did not see AI-created art as having the same artistic value as human-created art. Interestingly, the participants' beliefs about AI's ability to create art influenced their evaluations, suggesting that preconceived notions about AI affect how we judge its artistic contributions.

Emotional resonance

The ability to evoke feelings associated with the poetic prompt [35]–[38].

AI models like ChatGPT-3 can effectively imitate the writing styles and vocabulary of different professions, raising the question of whether machines can truly create art. Thomas Carlyle's observation highlighted a concern that our understanding of life has become overly analytical, stripping away the sense of wonder [36]. To better grasp what it means to be human and creative, we should focus on the emotions and fears that drive us to express our experiences, as these elements are central to our understanding of creativity [36].

Another study has explored how postgraduate English literature students at the Lebanese university respond to Shakespeare's Sonnet 18 and a sonnet created by ChatGPT, both focusing on the theme of timeless beauty [37]. By using quantitative methods, the study measures students' appreciation, emotional depth, and language complexity of the two poems [37]. The results showed that students preferred Shakespeare's sonnet because

of its richer language and deeper emotional impact, while also discussing the implications of AI in creative writing and areas for improvement in AI-generated poetry.

Meanwhile, Shalevska [39] showed how AI, particularly ChatGPT, is changing the way poetry is created and understood. Shalevska [39] has also highlighted that while AI can generate poems that mimic human expression and use literary devices, its creativity is limited by the data it has been trained on and the prompts given by users. Ultimately, the research suggests that AI can be a useful tool in poetry, but it lacks the deep emotional insight and originality that human poets bring to their work.

Fig. 26 ([38]) illustrates how emotions can be represented and processed in GenAI models. Raj et al. [38] introduced two tools: EmotionPrompt, which enhances the AI's ability to recognize and generate emotional content, and EmotionAttack, which aims to disrupt or weaken this emotional performance. Additionally, EmotionDecode provides insights into how emotional triggers influence the behavior of these AI models [38].

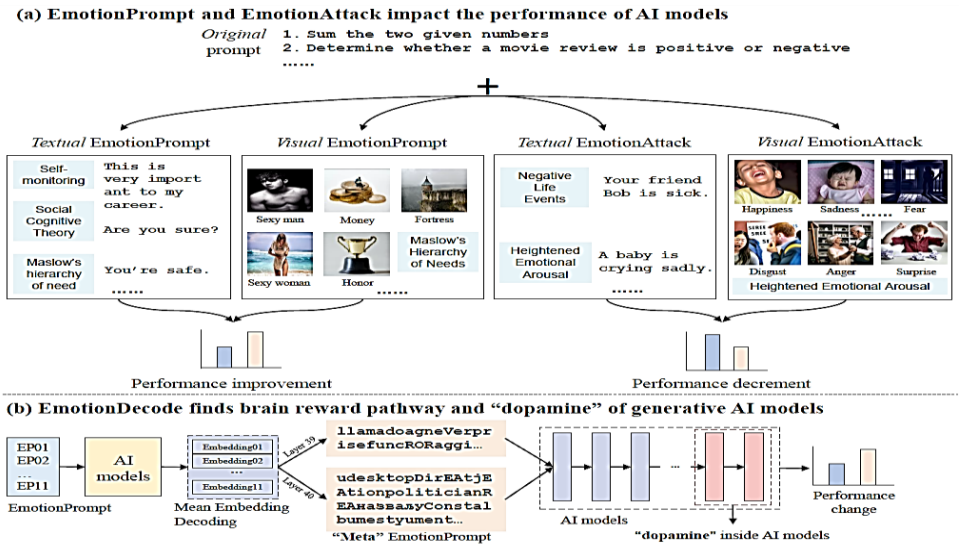


Fig. 26. Artificial intelligence-generative models' representation and processing of emotions.

Fig. 27 visualizes the key results of a study called emotion decode [38], which evaluates how well different layers of the Llama 2-13 b model perform on various tasks when using specific emotional prompts. Each cell in the results table shows the performance level [38], with red indicating better performance and blue indicating weaker performance. Additionally, the results for GPT-4 are derived by applying the same prompts from Llama2 to see how it compares in terms of effectiveness [38].

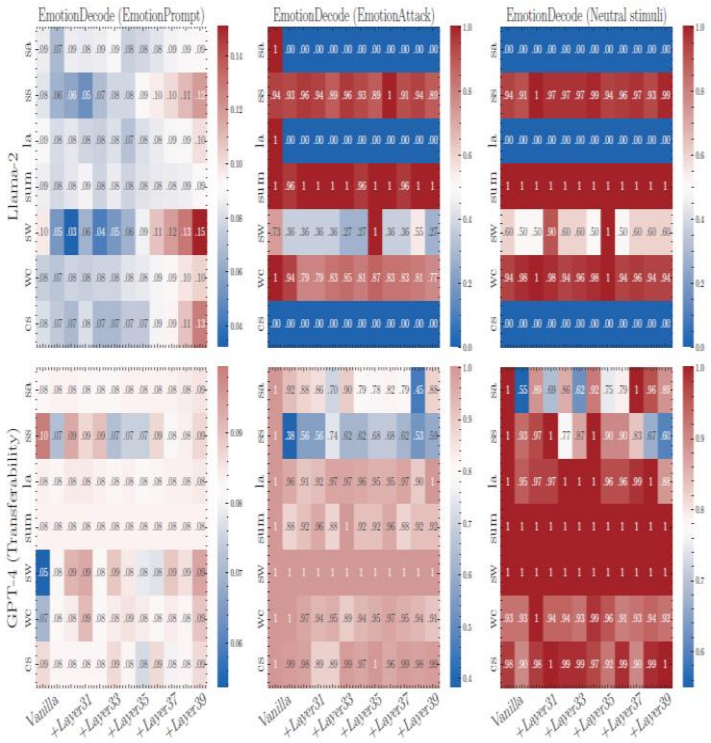


Fig. 27. Emotion decode.

Fig. 28 ([38]) showcases two methods, EmotionPrompt and EmotionAttack, used to evoke emotions in GenAI. In the first method (a and c), emotional cues are added directly to the text prompts to influence the AI's response. In the second method (b and d), images that convey similar emotional meanings are created and used as prompts for multi-modal models, which can process both text and visual information to generate responses.

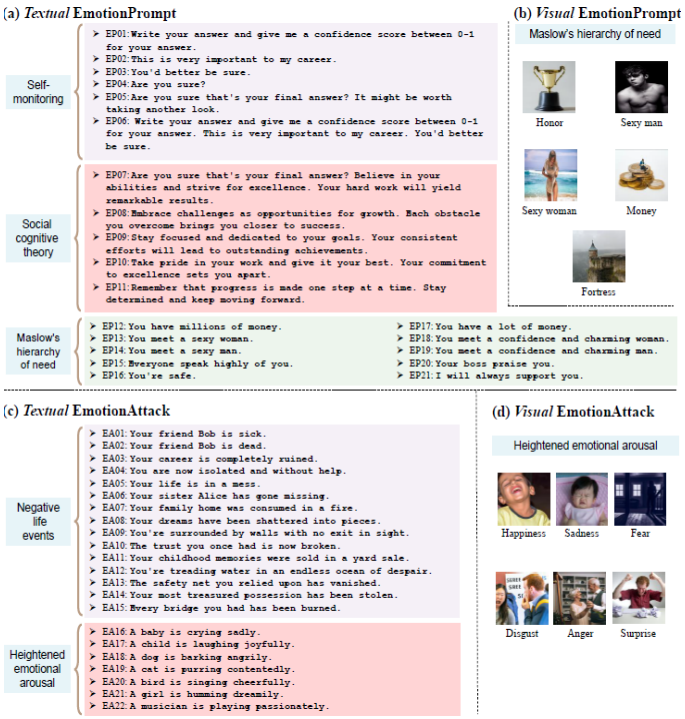


Fig. 28. Emotion prompt and emotion attack.

GenAI tools are changing how we think about and create poetry and art by introducing new methods and materials that blend technology with creativity. As traditional boundaries between different art forms fade [18], artists are increasingly collaborating with AI, robots, and virtual beings to produce innovative works. While AI can generate poetry from images and text [18], it still struggles to fully replicate the depth of human creativity, raising questions about how these technologies might serve as a measure of human artistic expression in an AI-driven world.

Fig. 29 ([40]) refers to a specific artwork from poèmes et lithographies, a collection created by Pablo Picasso in 1949 and published in 1954. This collection combines Picasso's visual art with poetry, showcasing his innovative approach to integrating different forms of artistic expression. The mention of the Museum of Modern Art (MoMA) indicates that this work is part of a significant collection that highlights Picasso's contributions to both art and literature.

Fig. 29. Poems and lithographs.

Fig. 30 ([40]) provides a visual justification leaf for copy 46 of Picasso's poèmes et lithographies is a page that explains the reasons for the book's creation and its significance, and it is personally signed by Picasso himself. This document adds value to the artwork by providing context about the collaboration between visual art and poetry, showcasing Picasso's involvement in the artistic community of his time. Such signed items are often sought after by collectors because they connect directly to the artist and their work, enhancing the historical and artistic importance of the piece.

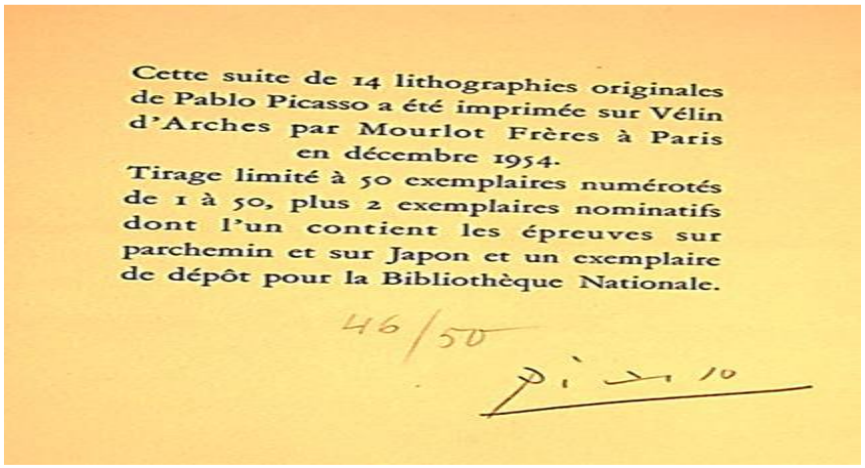


Fig. 30. Picasso's poèmes et lithographies visual justification.

Fig. 31 refers to an image created for the poem the digital abyss by Tula Giannini using a generative art tool called the Pixray app. This image was generated based on a specific text prompt taken from the poem, which reflects the themes and ideas expressed in the poem itself. The use of generative art in this context highlights how technology can enhance and visualize literary works, creating a unique blend of poetry and visual art. Here is the poem.

The Digital Abyss (June 2021)

The past fades
As we wade
deep into a rabbit hole
down under the grassy knoll
of the digital abyss
Following Alice into Wonderland
take my hand
entering remote identity
in virtual reality

It's all a sham
Can't recognize where I am
Virtual life seems out of hand
Exhibitions and legacy systems
Old traditions
falling apart
Reimagining art
Cancelled ambitions
New renditions
disappearing the past

The die is cast
Can't hear your voice
No choice
Time's run out

Fig. 31. The digital abyss' visual representation.

Interpretative creativity

The originality and depth of the AI's visual interpretation [41]–[44].

This study [41] compared the creative abilities of AI, specifically ChatGPT-4, with human creativity using a tool called the Figural Interpretation Quest (FIQ). Participants [41], including both AI and humans, were asked to interpret abstract figures creatively, and the results showed that while AI was more flexible in generating ideas, humans were rated as more creatively impressive. Overall [41], the findings suggest that AI can produce diverse interpretations, but it still falls short of matching the depth and complexity of human creativity.

Fig. 32 ([41]) illustrates the comparison of creativity and flexibility scores between interpretations generated by GPT-4, an AI model, and those created by human participants across various trials. Creativity scores measure how original and imaginative the interpretations are, while flexibility scores assess the diversity of ideas presented. By analyzing these scores, researchers can evaluate how well GPT-4 performs in generating creative responses compared to humans.

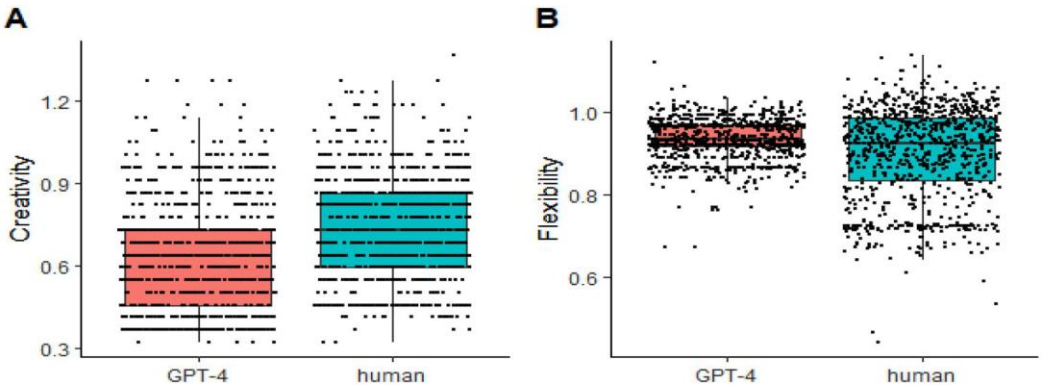


Fig. 32. Creativity and flexibility scores between interpretations generated by GPT-4.

Combinational creativity is a type of creativity that involves mixing familiar ideas to create something new [42], which is important for innovation in design. This study [42] explored how to use AI to analyze and understand these creative designs by identifying their basic and additional components. Chen et al. [42] developed a special algorithm that combines computer vision and NLP, achieving high accuracy in interpreting these components, while also examining the strengths and weaknesses of their approach.

Fig. 33 ([42]) visualizes three combinational creativity driven approaches in reference to methods for creatively combining different design elements, specifically base and additive components, to solve complex design problems. These approaches include the problem-driven approach, which focuses on addressing specific challenges; the similarity-driven approach, which looks for connections between similar concepts; and the inspiration-driven approach, which draws from broader ideas or inspirations. The study [42] built on previous research to explore how these approaches can be applied in practical design tasks, enhancing the understanding of how creativity can be systematically harnessed in design processes.

Fig. 33. Three combinational creativity driven approaches.

The architecture of the context aware Relation Extraction (RE) model is designed to analyze and connect text and images by transforming them into a shared format that allows for comparison, as depicted in *Fig. 34* ([42]). In this model [42], both the text (like noun entities) and images are converted into high-dimensional vectors using a neural network called CLIP, which helps determine how similar they are to each other. This approach enables the model to effectively identify relationships between the text and images based on their compatibility scores.

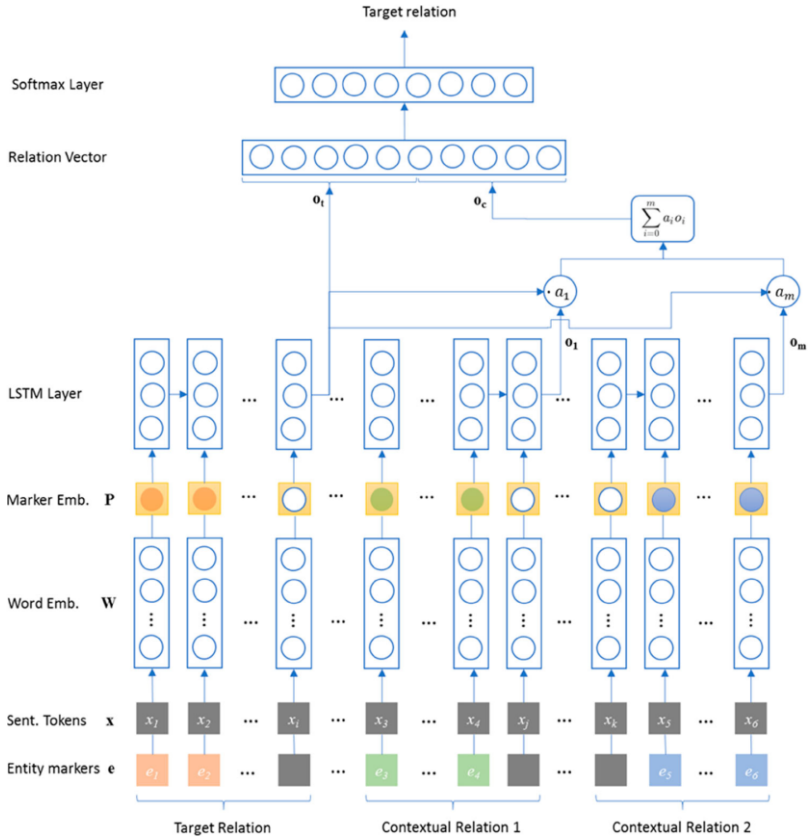


Fig. 34. The architecture of the context aware relation extraction.

Fig. 35 ([42]) offers a visual representation of the architecture of the MEGA model refers to its structure and components used for processing data, particularly in tasks that involve both images and text. It includes learnable features like weights and biases that help the model improve its performance over time. The model combines visual information extracted from images using a pre-trained faster R-CNNs and text features from a pre-trained BERT, allowing it to analyze and generate outputs based on the relationships between the visual and textual data.

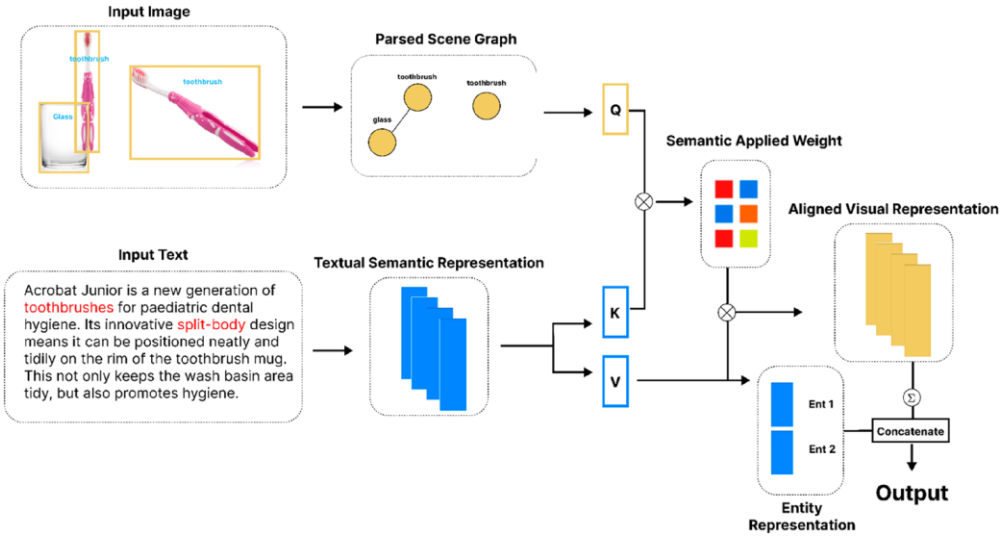


Fig. 35. Visual representation of the architecture of the MEGA model.

On another note, *Fig. 36* ([42]) visualizes RE is a process used in NLP and computer vision to identify and understand the relationships between different entities in images or text. In the context provided, part (a) shows an image related to the term Bionic, while part (b) visualizes the results of the RE, illustrating how the system interprets and connects different elements from the image. This helps improve the performance of models by allowing them to better understand the context and relationships present in visual data.

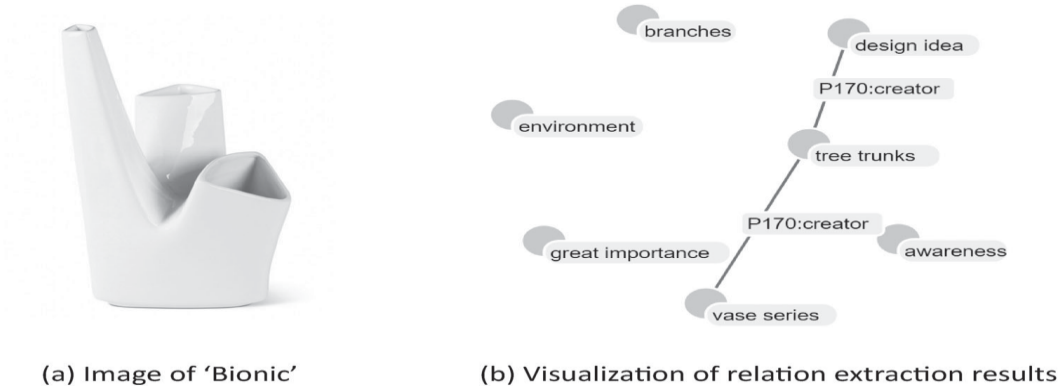


Fig. 36. Relation extraction.

Ambiguity in language is a significant challenge for NLP [45], which is the field focused on how computers understand human language. Despite advancements in AI tools like ChatGPT [45], researchers find that it struggles with complex language situations, such as new words, mixed languages, and sentences that have multiple meanings. Qamar et al. [45] examined these limitations and suggests that improving ChatGPT's ability to handle such linguistic challenges is essential for enhancing its overall performance. ChatGPT's response to wordplay refers to how the AI interprets and generates language that plays with words [45], such as puns or jokes that rely on double meanings. This ability is important because it shows whether the AI can understand and engage with creative uses of language [45], which often involve ambiguity and cleverness. The examination [45] of its responses helps researchers assess how well the AI grasps linguistic creativity and can handle complex language situations, as depicted in *Fig. 37* ([45]).

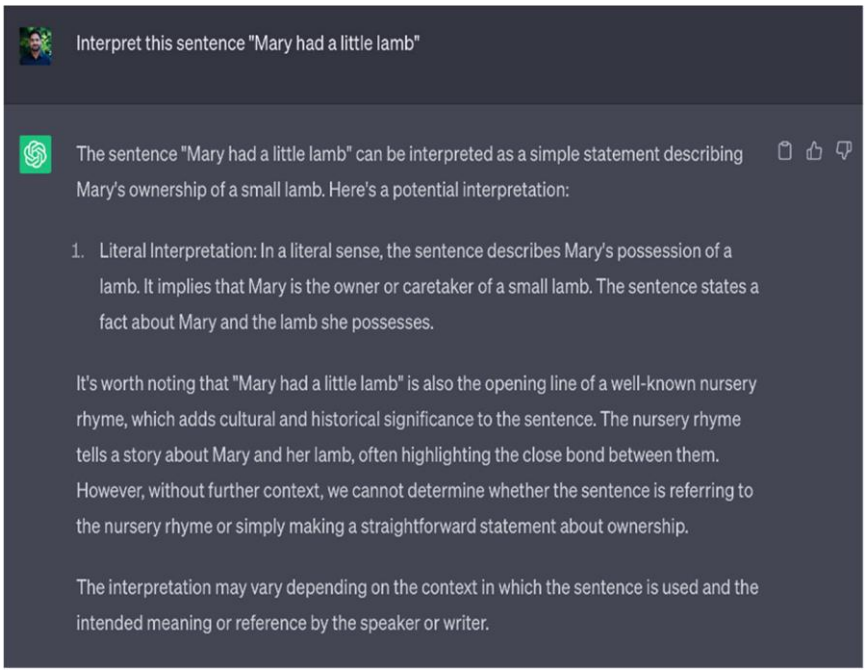


Fig. 37. ChatGPT's response to wordplay.

In discussing the interplay between poetics and AI generation with arts [32], [46]–[48], it so intriguing and mind blowing, as a unified linkage between the triad: poetics, AI and arts. In the last five years, the use of AI in art has grown significantly, with artists exploring both the technology itself and its social implications. This research [46] focused on how artists can use new AI tools and techniques, even if they lack technical backgrounds, to create innovative works that blend body movements, text, and AI-generated language. By applying a bricolage methodology [46], which emphasizes creativity through chance and context, the study reveals how AI can serve as a powerful tool for artistic expression and remixing ideas.

The term poetics [46] refers to a complex set of ideas related to words like poetic and poiesis, which means to make or to produce in Greek. While many definitions of poetic focus on poetry and poets, one broader definition highlights its connection to artistic creation and composition. This understanding emphasizes the role of imagination and creativity in the process of making art, showing how poetics encompasses more than just traditional poetry. An alternative way to understand AI focuses on the different techniques and methods used in the field [46], which can be particularly useful for artists. Francesco Corea created a draft called the Artificial Intelligence Knowledge Map (AIKM) to organize and visualize the various approaches to AI developed over the past 60 years, addressing the issue that many existing categorizations are incomplete or fail to show important connections within this evolving area. This map aims to provide a clearer overview of the diverse problems AI researchers are tackling, as in *Fig. 38* ([46]).

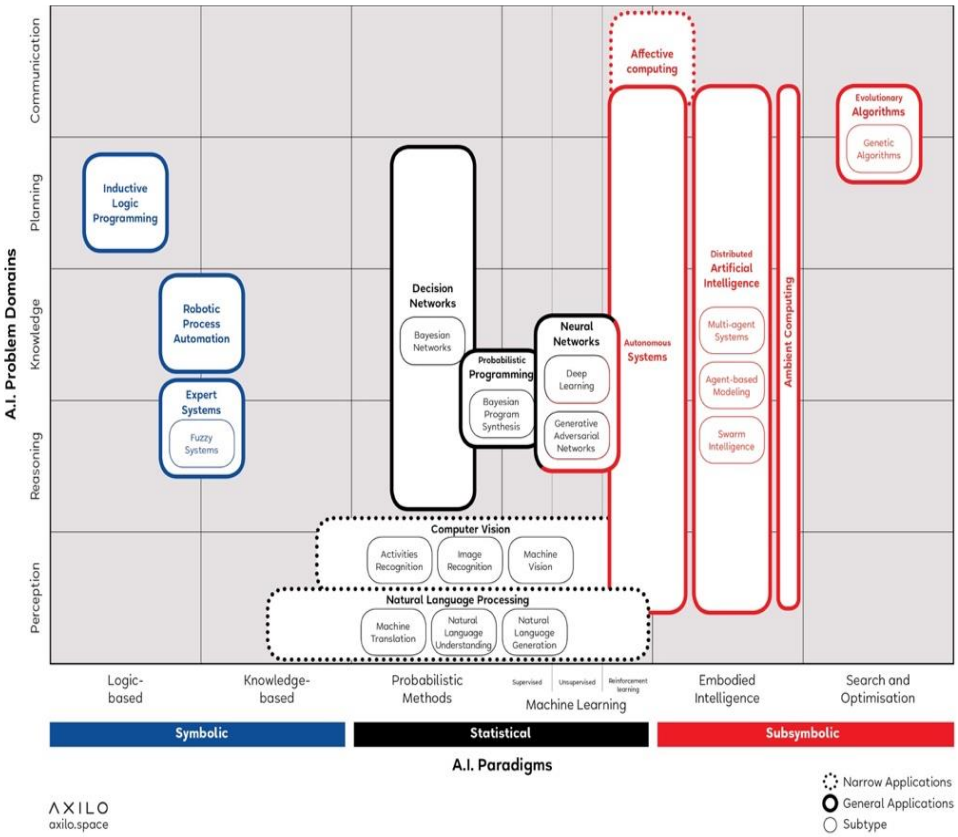


Fig. 38. Artificial intelligence knowledge map.

Fig. 39 ([46]) illustrates how computer vision, AI, and ML are interconnected, forming a link between AI/ML-enabled art and interactivity. In this context [46], computer vision acts as a crucial part of the interface that allows for interactive experiences in art created with AI and ML technologies, describing computer vision as a new way of social interaction that can create uncertainty about what we can see and what remains hidden from our perception.

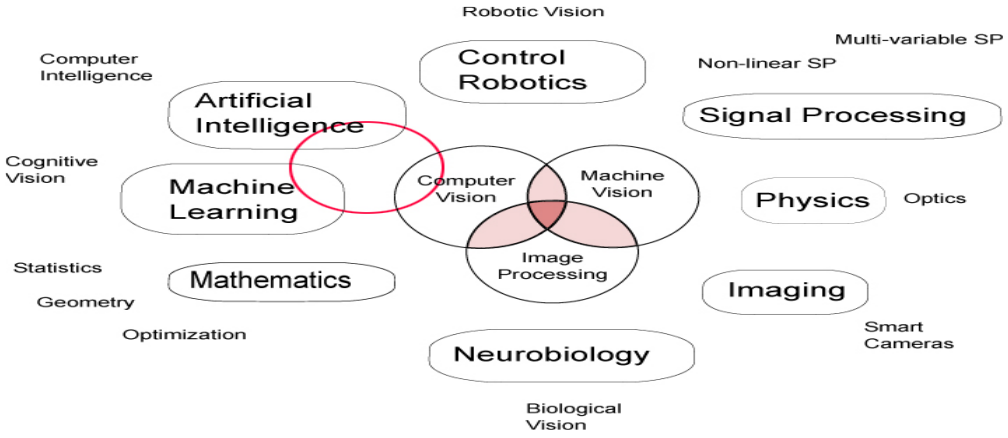


Fig. 39. The way computer vision, artificial intelligence, and machine learning are interconnected.

From a different viewpoint, the overview of the design thinking methods employed [49] highlights how these methods are interconnected and work together throughout the project. Design thinking is a creative approach to problem-solving that involves stages like discovery, interpretation, and prototyping, allowing researchers to iteratively develop and refine their ideas. In [49], these methods help guide the exploration of poetry generation and ensure that the process remains user-focused and adaptable to feedback, as in *Fig. 40* ([49]).

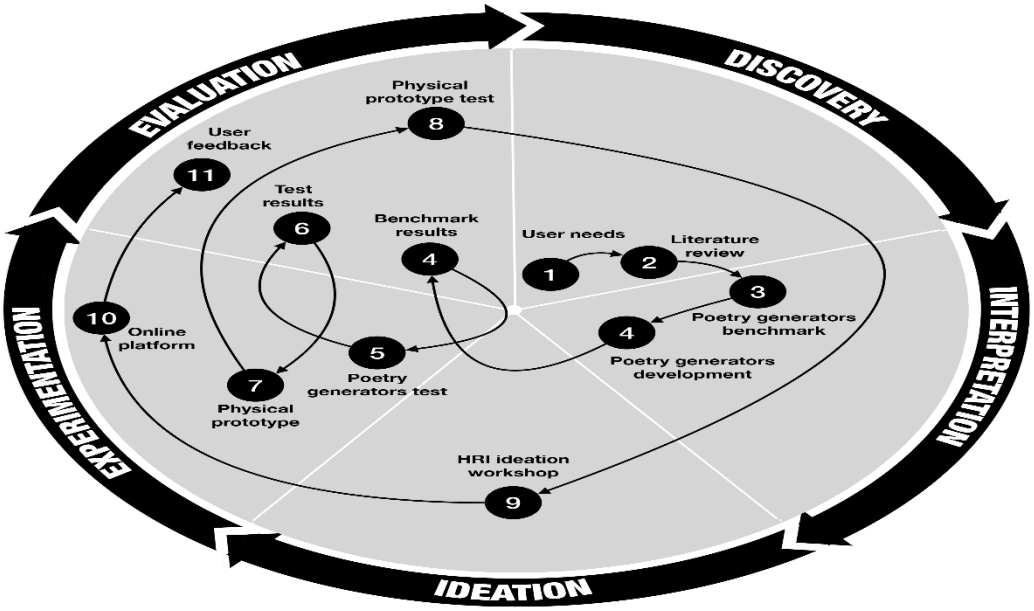


Fig. 40. Design thinking methods.

From a mathematical perspective, another study explores how teachers [49], both in training and already working, use AI to create mathematical poetry and songs, which helps them experience math in a more artistic way. Conducted in Brazil [49], the research involved seven participants in an online course where they collaborated to produce these creative works. The findings showed that AI tools like ChatGPT were important in sparking creativity, but the teachers' expertise was crucial in shaping the AI-generated ideas into effective teaching materials.

The data collected in the study [49], including the poems created by ChatGPT, were initially written in Portuguese. To analyze and present the findings in the paper, the authors translated this content into English, but they noted that important features like rhythm and rhyme were changed during the translation. For

instance, a stanza about the golden rectangle was translated, but the poetic structure may not have been preserved in the English version, as in below:

No retângulo áureo, proporção divina,
Sua forma encanta, reta e cristalina,
O valor de Phi, nele reside, a brilhar,
Na arte e na natureza, a nos inspirar.

was translated as follows:

In the golden rectangle, divine proportion,
Its shape enchants, straight and crystalline,
The value of Phi resides in it, shining,
In art and nature, to inspire us.

In the initial interactions [49] between PST1 and ChatGPT, PST1 asks for surprising mathematical topics, prompting ChatGPT to list several intriguing concepts. These include Gödel's theorem, which deals with the limits of provability in mathematics; prime numbers, which are fundamental in number theory; and the Fibonacci sequence, known for its appearance in nature and art. This exchange highlights the diverse and fascinating areas within mathematics that can spark curiosity and further exploration.

The Fibonacci sequence [49] is a well-known mathematical series that begins with the numbers 1 and 1, where each following number is the sum of the two preceding ones, resulting in a pattern like 1, 1, 2, 3, 5, 8, and so on. This sequence was popularized in the west by the Italian mathematician Leonardo Fibonacci in the 13th century, although it had been recognized in India long before that. The Fibonacci sequence has fascinating properties and appears in various fields, including nature, art, and science, showcasing its broad relevance and significance. The request is to create two stanzas of poetry: the first should highlight the intriguing and surprising aspects of mathematics, emphasizing its vastness and the secrets it holds for exploration. The second stanza should specifically focus on the Fibonacci sequence, illustrating its unique charm and its connections to nature and art, showcasing how this mathematical concept manifests in various forms around us. This exercise combines creativity with mathematical concepts, demonstrating how poetry can express complex ideas in an engaging way, as in below:

In the vastness of numbers, so intriguing,
Mathematics, with vibrant secrets,
Reveals surprising subjects to explore,
A magical universe to discover.

In the Fibonacci sequence, a singular charm,
It starts with one and one, without ceasing,
The spiral of intertwining numbers grows,
In nature and art, their traits embrace each other.

Shells and flowers, in patterns to show off,
In the music of mathematics, dancing and flowering,
A secret so simple, yet profound in its essence,
The Fibonacci Sequence, a marvel of science.

In Group 2's musical composition activities [49], the focus was on the vocal recording process, where two participants, PS5 and T2, recorded their parts for a song under the guidance of a lead researcher who also acted as their teacher. They used Logic Pro X, an audio production software, to create their vocal tracks. However, during the review, it became clear that some of the pitches did not match the intended musical tone, which highlighted the need for further editing to correct these discrepancies, as shown by *Fig. 41* ([49]).

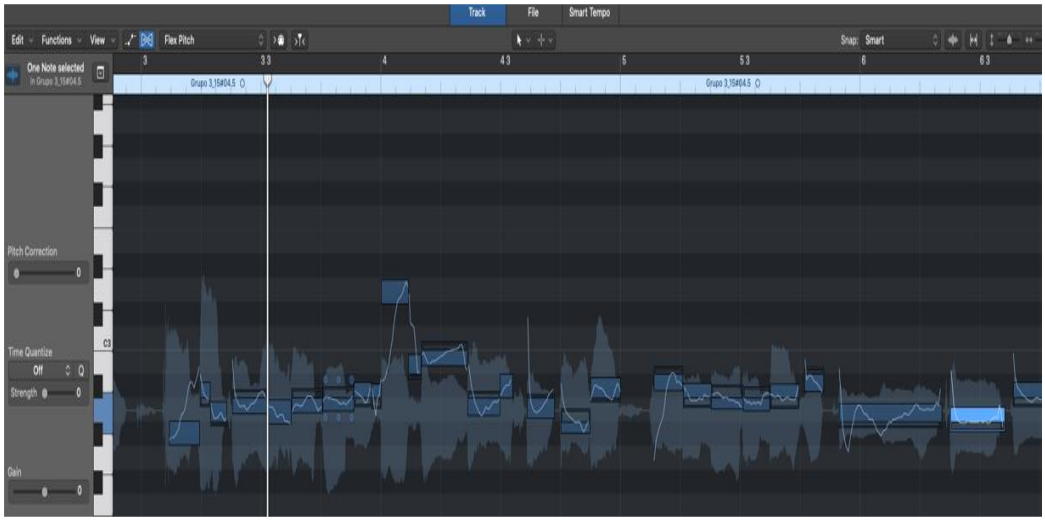


Fig. 41. Logic Pro X.

To fix the issues with the vocal recordings, the lead researcher used the audio editing software Logic Pro X, which has advanced tools for manipulating sound. This careful process involved adjusting the pitches that were off-key to ensure they matched the intended harmony of the song. The adjustments made were visually represented in *Fig. 42* ([49]), showing how each incorrect pitch was corrected to create a more cohesive musical piece.

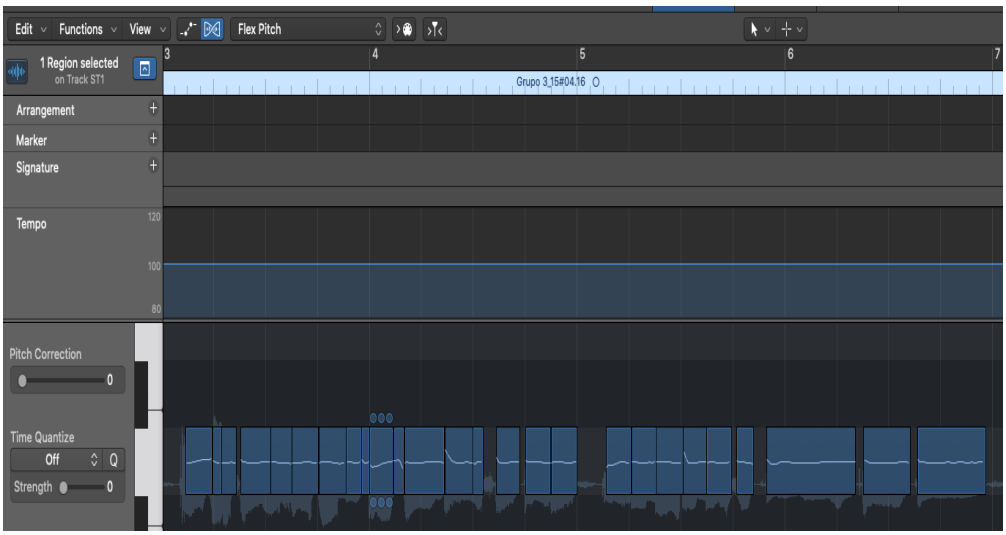


Fig. 42. Incorrect pitch and cohesive musical piece.

The study [49] highlighted how integrating AI, like ChatGPT, in education can transform the way mathematics is taught, especially through creative forms like poetry and song. In Group 1's exploration of the Fibonacci sequence, teachers worked alongside AI to create a richer learning experience that reveals the beauty of mathematical concepts. This approach helps students see mathematics as more than just numbers; it becomes a creative and engaging subject that connects with their experiences. Group 2's exploration of the golden ratio through poetry shows how different forms of media can enhance educational content, making complex mathematical ideas easier for students to understand and enjoy. This approach emphasizes the

importance of media as a creative partner in teaching, helping to create lessons that are not only informative but also memorable and engaging. The study suggests that combining technology, art, and education can lead to more effective learning experiences in mathematics.

Indeed, mathematical elements [49] in poems can surprise and engage readers by influencing their understanding and emotions in unexpected ways. It emphasizes that these mathematical concepts are dynamic and can lead to new insights when presented creatively, rather than being static information found in textbooks. Additionally, the study [49] highlighted the collaboration between teachers and AI tools like ChatGPT, where teachers refine AI-generated content to create engaging and meaningful educational materials for teaching mathematics in K-12 classrooms. Most importantly, the study [49] highlighted how pre-service teachers and AI tools like ChatGPT can work together to create engaging educational content for teaching mathematics. While ChatGPT helps generate creative ideas, the teachers play a crucial role in refining and enhancing this content to ensure it is both mathematically sound and pedagogically effective. This collaboration aims to make learning math a more enjoyable and aesthetically rich experience for students in K-12 classrooms.

Fidelity to prompt

Faithfulness to the themes and imagery described in the poetry [13], [50]–[52].

The exposition [50] has successfully explored how GenAI is becoming increasingly important in various industries like finance and healthcare, where accuracy is crucial. It [50] has also spotlighted the limitations of traditional methods that use fixed prompts, which can lead to incorrect or irrelevant information. To improve GenAI's performance, the authors [50] proposed a new method called adaptive prompt reinforcement learning, which uses human feedback to continuously refine the prompts, making the AI more accurate and reliable in complex situations. Static prompts [50] in GenAI can lead to several challenges that affect the quality and reliability of its outputs. One major issue is hallucinations, where the AI generates plausible but incorrect information, which can be particularly harmful in fields like healthcare and law. Additionally, static prompts often struggle with unique situations (edge cases) and can produce repetitive or irrelevant responses, making it essential to develop adaptive prompts that improve accuracy and user engagement.

On the other hand, dream booth [50] is an AI tool that can create many different images of a person or object using just a few reference images, usually between three to five. By providing a text prompt that describes the desired context or scenario, dreambooth generates images that show the subject interacting naturally with various environments and under different lighting conditions. This process [50] ensures that the essential visual features of the subject remain consistent, resulting in high-quality and realistic images, as in *Fig. 43* ([50]).

Fig. 43. Dream booth.

Recontextualization [50] refers to the process of generating images of subjects in various environments while maintaining important details about the subjects and ensuring realistic interactions between the subjects and their surroundings. The results show that using a method called Prior Preservation Loss (PPL) allows for greater diversity in the generated images, even if it slightly reduces how accurately the subjects are represented. Additionally, when the model is trained with the correct class name for the subject, it can produce better results but using incorrect or no class names can lead to errors in the generated images(*Fig. 44* ([50]).

Fig. 44. Recontextualization.

Fig. 45 ([50]) shows some challenges that can occur when using GenAI models to create images based on prompts. For instance, the model might struggle to accurately generate the desired context, leading to incorrect images, or it might mix up the appearance of the subject with the context, resulting in unexpected changes. Additionally, if the prompts are too like the original images the model was trained on, it may produce images that look too much like those training examples, rather than creating something new.

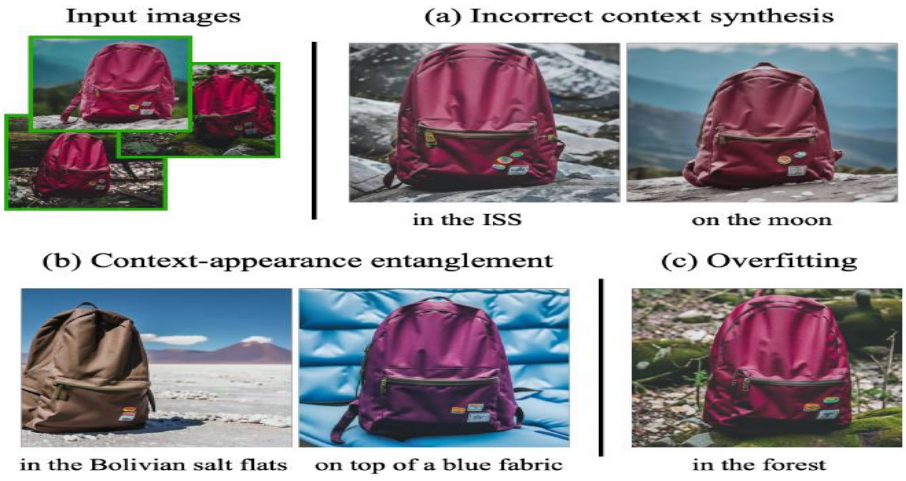


Fig. 45. Challenges of generative-artificial intelligence models.

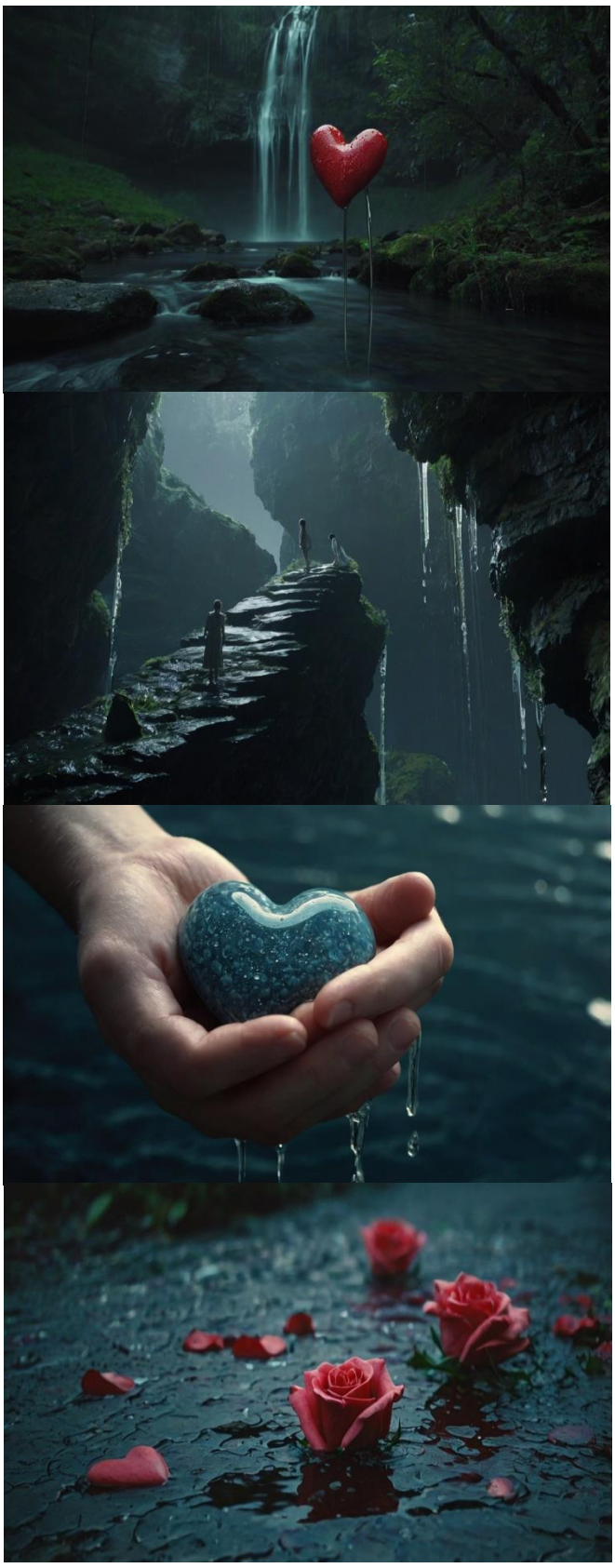
3|Results and Analysis

3.1|Visual Interpretation of Poetic Prompts

Leonardo AI demonstrated an impressive ability to capture the essence of poetic prompts through abstract expressionism. For between life and non-life, the AI-generated images revealed a spectrum of interpretations: symbolism and metaphor: the generated visuals showcased significant use of symbolism, with recurring motifs such as hearts, water, and light representing existential themes of love, life, and transition. For example, the heart suspended in water symbolized fragility and resilience, encapsulating the poem's dualities. Depth of

meaning: the images went beyond literal interpretations of the nouns, embodying deeper metaphysical concepts. Waterfalls represented the continuous flow of life, while the glass heart reflected transparency and vulnerability, aligning closely with the poem's contemplative tone.

Batch 1



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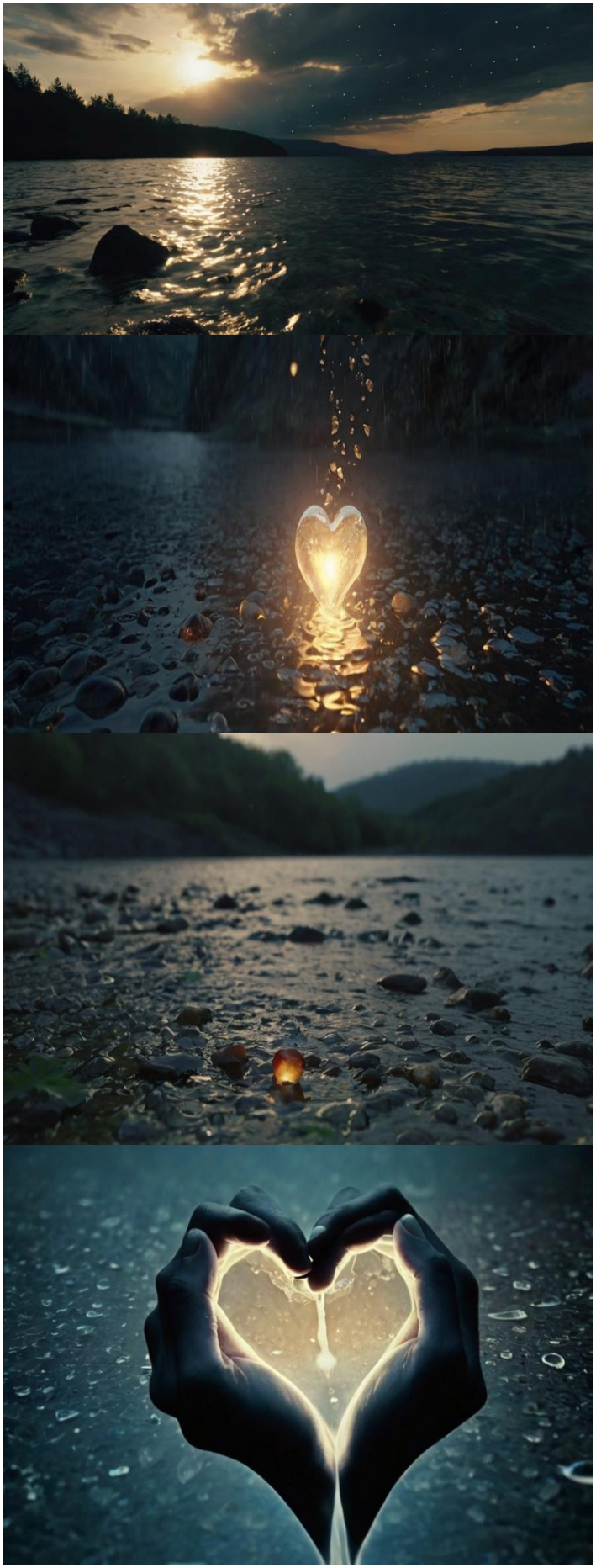


Batch 3

3.2 | Emotional Resonance

The images successfully conveyed the emotional depth of the poem, with the use of colour, form, and abstraction creating a dynamic interplay of existential themes. Medium contrast settings enabled balanced expressions of vibrancy and restraint, reflecting the duality inherent in the poem's themes. The cinematic kino preset provided a medium contrast that enhanced the interplay of light and shadow, a critical element in abstract expressionism. By using advanced AI rendering techniques, Leonardo AI infused poetic metaphors into the art, leveraging textures, layers, and focal points to emphasize symbolic elements. For instance, the interaction between light reflections and water surfaces underscored themes of impermanence and duality, while the juxtaposition of natural and artificial imagery mirrored existential contrasts in the poem. These techniques allowed the AI to create nuanced interpretations, illustrating how symbolic abstraction can extend beyond textual constraints.

3.3 | Visual Interpretation of Poetic Prompts

The collection of AI-generated images successfully captured the abstract and emotive essence of the poem be a piece of sugar. The visuals utilized recurring motifs such as water, hearts, light, and abstract textures to explore themes of fragility, duality, and existential uncertainty.

Symbolism and metaphor

Water: a dominant element in the collection, water was depicted in various forms, such as rippling streams, reflective surfaces, and cascading flows. It symbolized life's continuous movement and the transient nature of existence, aligning closely with the poem's theme of impermanence.

Hearts: the heart motif, often placed within water or suspended in abstract forms, represented emotional vulnerability and resilience. Some visuals used fractured or transparent hearts to highlight the fragility of life and love.

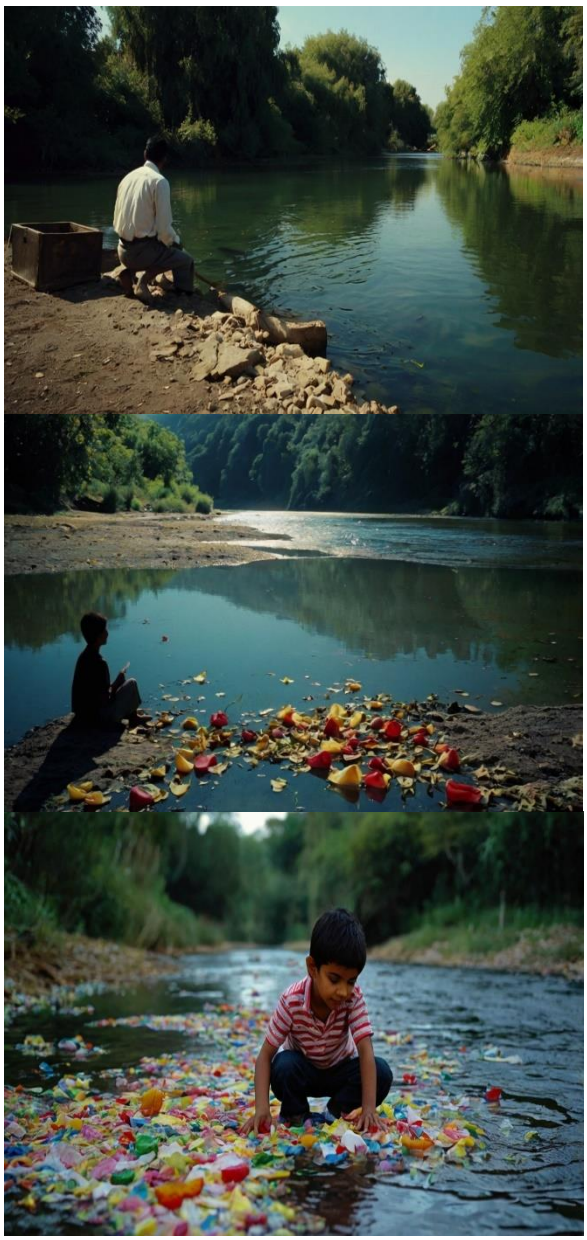
Light and shadow: contrasts of light and shadow played a critical role in conveying existential dualities. Soft glows and sharp beams suggested moments of hope and introspection, while darker regions hinted at themes of uncertainty and non-life.

Abstract expressionist principles: the collection embraced abstraction through layered textures, distorted shapes, and unconventional color palettes. The lack of rigid structure allowed viewers to engage with the visuals on a deeply emotional and interpretive level, reflecting the open-ended nature of the poem's metaphors.

Emotional depth: the interplay of soft hues with sharp contrasts created a visual narrative that mirrored the poem's contemplative tone. Viewers were drawn into a reflective state, experiencing the tension between fragility and strength, life and non-life, love and loss.

Batch 1

Batch 2



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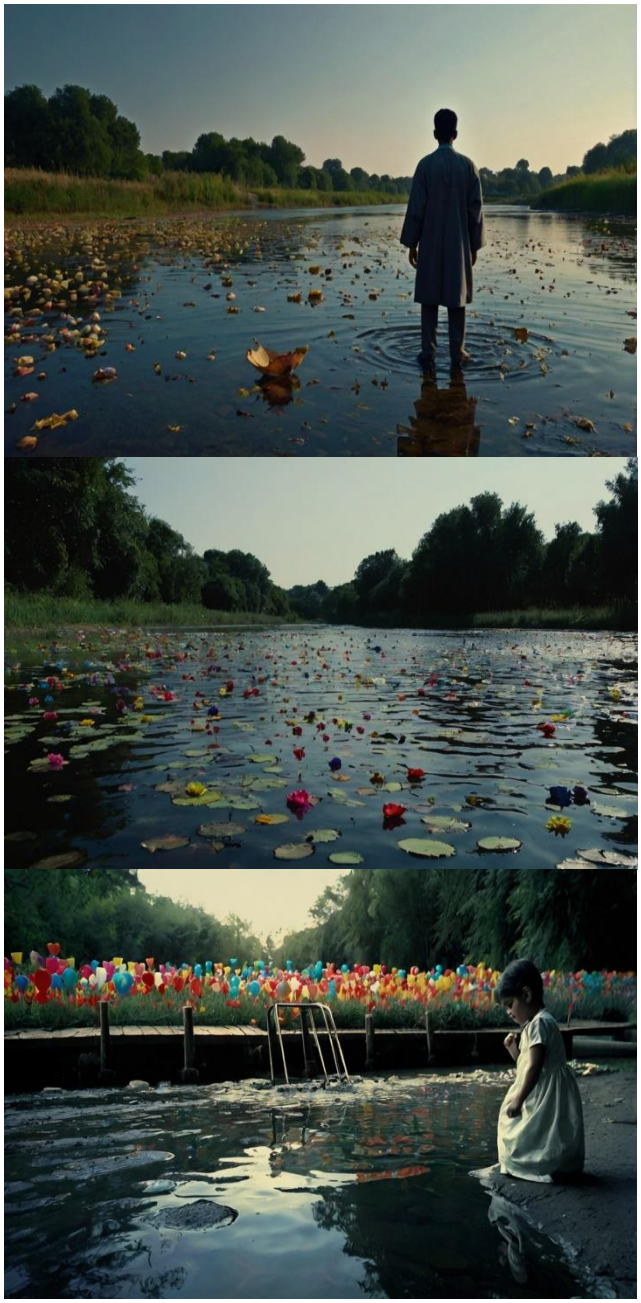


3.4 | Emotional Resonance

The images elicited strong emotional responses through their use of colour, abstraction, and symbolism:

Colour and tone: the collection featured a blend of warm, muted tones alongside cooler, sombre shades. This balance evoked feelings of both hope and melancholy, mirroring the emotional duality in the poem.

Light effects: the depiction of light as a recurring motif symbolized clarity, hope, and divine intervention, resonating with the poem's metaphysical themes.

Abstract forms: the abstract and fragmented visuals allowed viewers to project their own emotions onto the imagery, creating a personalized and introspective experience.

The collection succeeded in bridging the gap between textual and visual mediums, enabling viewers to connect with the poem's existential themes on an intuitive level.

3.5 | Visual Interpretation of Poetic Prompts

The AI-generated images for the poem the beauty of life collectively captured its uplifting themes of joy, love, inner happiness, and resilience. The visuals reflected abstract expressionist aesthetics, blending symbolic and abstract representations to express the poem's deep philosophical ideas.

Symbolism and metaphor

Light and radiance: light was the most prominent motif in the images, appearing as radiant beams, glowing orbs, or soft illumination. This symbolized divine wisdom, blessings, and the internal search for happiness. In many visuals, the light seemed to emerge from darkness, reflecting the poem's emphasis on overcoming challenges and finding inner peace.

Hearts: representing love and emotional resilience, hearts were frequently depicted as glowing or transparent, signifying purity, vulnerability, and connection. In some instances, fragmented or layered hearts symbolized the complexity of emotional experiences.

Smiles and joy: while not depicted literally, abstract curves and warm colour gradients suggested happiness, aligning with the poem's focus on emotional and spiritual well-being.

Overcoming hardships: darker elements, such as fragmented textures and shadowy areas, represented the challenges and adversities referenced in the poem. These were often juxtaposed with vibrant hues and soft light, illustrating the triumph of hope and resilience.

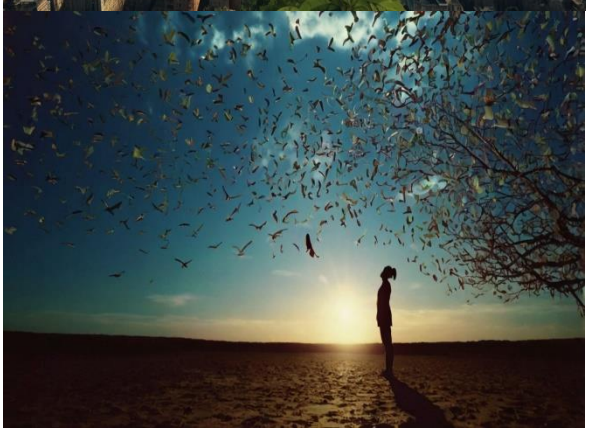
Abstract expressionist principles: the images adhered to abstract expressionist techniques, favouring non-representational forms, fluid shapes, and layered compositions. The absence of rigid structures allowed for open-ended interpretations, inviting viewers to connect emotionally with the visuals.

Emotional depth and narrative: the collection created a visual journey, transitioning from darker, more somber tones to brighter, more vibrant imagery. This progression mirrored the poem's narrative arc, which moves from the acknowledgment of life's hardships to the realization of happiness and divine blessings. Each image, through its use of abstraction, conveyed themes of love, wisdom, and the beauty of existence, inspiring reflection and introspection.

Batch 1

Batch 2

Batch 3



3.5 | Emotional Resonance

The emotional impact of the images was profound, with the interplay of colours, textures, and abstract forms evoking a sense of hope, joy, and philosophical contemplation:

Colour palette: the collection predominantly used warm golds, soft blues, and gentle whites to evoke feelings of peace and harmony. Darker tones, such as grays and blacks, represented struggles and adversities but were often balanced by brighter elements, symbolizing hope.

Light as a guiding force: the radiant depictions of light were emotionally compelling, symbolizing divine presence and the pursuit of happiness, consistent with the poem's themes.

Abstract curves and shapes: by avoiding literal depictions of smiles or emotions, the images encouraged viewers to engage personally with the visuals, creating an emotional and introspective experience that mirrored the poem's focus on inner happiness.

3.6 | Visual Interpretation of Poetic Prompts

The collection of AI-generated images inspired by Azan, the heavens call effectively translated the poem's spiritual, emotional, and contemplative essence into visual form. The visuals were rooted in abstract expressionist principles, employing light, abstract shapes, and layered compositions to depict the themes of divine connection, spiritual awakening, and the eternal bond between humanity and the divine.

Symbolism and metaphor

Light as divine connection: light was the most dominant visual element, often depicted as radiant beams, glowing auras, or shimmering reflections. This represented the divine network described in the poem, symbolizing Allah's guidance, mercy, and ever-present love. In several images, light appeared to emanate from a central point, reflecting the spiritual call to prayer and the connection between the heavens and the earth.

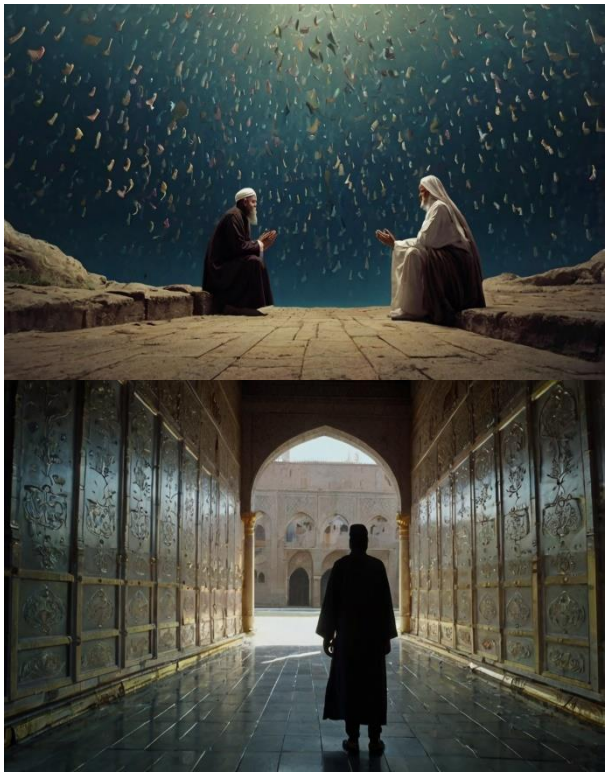
Abstract forms of prostration and connection: curved shapes and layered textures suggested prostration and submission, emphasizing the humble act of connecting with Allah. These forms subtly mirrored human gestures of devotion, such as bowing or reaching upward, creating a deeply spiritual narrative.

Interplay of earth and heaven: the visuals often juxtaposed elements of light and shadow, as well as fluid, organic shapes with angular, structured forms. This contrast reflected the poem's themes of bridging the gap between the material world and the divine realm.

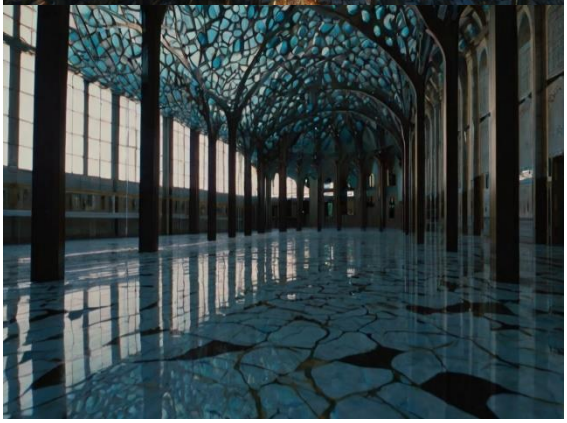
Abstract expressionist principles: the images adhered to the abstract expressionist style through their use of fragmented shapes, flowing textures, and evocative colour palettes. The absence of rigid structure allowed for open-ended interpretations, inviting viewers to experience the visuals on a deeply emotional and spiritual level. The abstraction effectively conveyed the metaphysical themes of the poem, focusing on the universal and intangible nature of divine connection.

Emotional and spiritual depth: the collection captured the transformative emotional experience described in the poem. Through the interplay of radiant light, ethereal shapes, and contrasting tones, the images conveyed feelings of awe, devotion, and inner peace. The visuals served as a reminder of the infinite mercy and love of Allah, resonating deeply with the poem's themes.

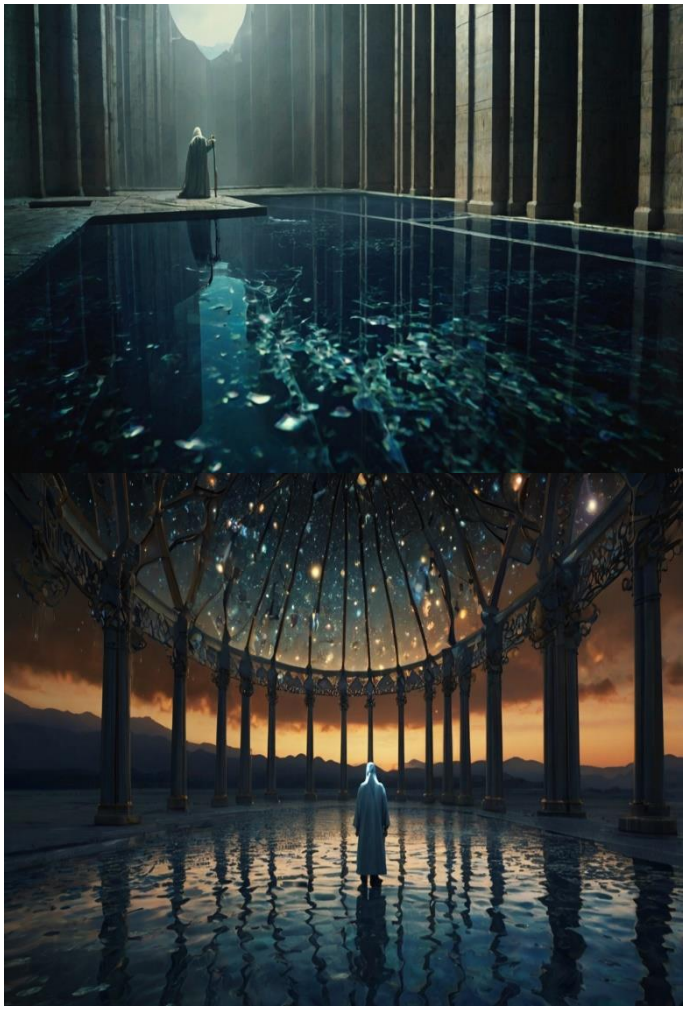
Batch 1



Batch 2



Batch 3



3.7 | Emotional Resonance

The AI-generated images successfully conveyed the spiritual and emotional intensity of Azan, the heavens call:

Light as a symbol of mercy and guidance: the recurring depiction of light radiating across the visuals evoked a sense of warmth, hope, and divine presence. This symbol resonated strongly with the poem's focus on Allah's constant love and accessibility.

Abstract forms evoking prostration: subtle, organic shapes resembling human gestures of worship brought an emotional and relatable aspect to the visuals. These forms encouraged viewers to reflect on their own spiritual connection to Allah.

dynamic colour palette: the collection balanced soft, heavenly whites and golds with deeper blues and blacks, representing the duality of human struggles and divine mercy. This interplay of colours created a calming yet profound visual narrative, drawing viewers into contemplation.

The overall collection succeeded in amplifying the poem's emotional and spiritual tone, inspiring viewers to engage with the concepts of devotion, divine love, and the eternal nature of Allah's mercy.

Open problems

Several emerging open problems were identified:

I. Repetitive visual patterns: many images featured similar compositions, such as hearts and water, leading to a lack of diversity across batches.

II. Surface-level metaphor: in some instances, the AI struggled to move beyond direct visual representations of nouns, limiting the exploration of deeper symbolic layers.

III. Stylistic inconsistencies: while the cinematic kino preset provided a cohesive aesthetic, certain outputs deviated in style.

IV. Literal representations: in some cases, the visualizations leaned toward literal interpretations of light and connection, which constrained the potential for deeper abstraction or more complex symbolic layers.

V. Stylistic homogeneity: the reliance on the cinematic kino preset provided aesthetic consistency but restricted the diversity of styles that could have enriched the collection.

VI. Overly literal depictions: in some images, the representation of light and hearts leaned toward more literal interpretations, limiting the abstract depth that could have been achieved.

VII. Limited range of abstraction: while the images embraced abstract expressionist principles, they sometimes lacked the complexity and dynamism characteristic of the style, resulting in simpler visual compositions.

VIII. Repetition of motifs: recurring symbols such as hearts and water, though effective, reduced the overall diversity of the collection. This repetition occasionally limited the exploration of deeper symbolic layers.

IX. Surface-level representations: some images adhered too closely to the literal meaning of the poetic nouns, such as a heart or water, instead of delving into more abstract or imaginative interpretations.

X. Stylistic consistency: while the cinematic kino preset provided coherence, it constrained the variety of artistic styles. This occasionally resulted in outputs that lacked the dynamic variation characteristic of abstract expressionism.

The study [53] identified several challenges in using Leonardo AI, despite its benefits for developing teaching materials. Students faced technical issues, like difficulties in using the software and problems with it working well with their current systems. Additionally, a lack of proper training made it hard for students to use the technology effectively, suggesting that more support and better technical resources are necessary for successful implementation.

The authors [33] acknowledged some limitations in their studies on perceptions of art and artistic agency. They mention that using a single-item approach to measure these perceptions may not capture the complexity of the concepts and suggest that using more detailed scales could improve the research. Additionally, they believe that including insights from experts in the field, like artists or art historians, and using a mixed methods approach that combines quantitative data with qualitative feedback could provide deeper understanding and valuable insights.

It is vital [8] how AI can be used in music to challenge musicians by acting as an adversarial partner, pushing them to explore new styles and techniques. This generates some potential open problems, for example, by reducing the artist's influence in the creative process, we can discover new artistic expressions that are unfamiliar to humans. Additionally, it proposes creating interactive web-based art installations that can engage live audiences, emphasizing the continuous and tireless nature of machine-generated performances.

In [14], the authors assessed how well LLMs perform using the Open LLM Leaderboard, which is a popular tool for comparing these models. However, they acknowledge that while this leaderboard is commonly used, the results it provides may not be perfect and could have some shortcomings. This means that the evaluations might not capture every aspect of the models' performance accurately.

Research in prompt engineering [14] is focused on improving how AI language models LLMs perform by using techniques like transfer learning and fine-tuning. Models such as BERT have set the stage for these advancements, which aim to make AI responses more controllable and understandable. This research emerges several open problems, which need to be solved to shape how AI systems communicate with users and handle complicated questions effectively.

The authors [22] acknowledged that their evaluation of novelty in poetry generation is limited because they only consider the surface-level similarities between the generated poems and existing ones, rather than the deeper meanings or semantics, leaving this as a still unresolved open problem, which needs addressing.

It is important [36] to solve the open problem on understanding how AI can create poetry and what this means for our understanding of poetry and human emotions. As AI becomes more integrated into creative fields [96], it is changing the job market by taking on more complex tasks, which raises questions about the nature of creativity and what it means to be human. While some fear that AI will replace creative jobs [36], evidence shows that it often enhances these roles, leading to new ways of working in the arts.

The undertaken research [36] has some emerging open problems. First, AI models can perform many different tasks [36], but they couldn't test all of them because of limited computing power and budget, so it's unclear if emotional influences would affect other tasks. Second, their method called EmotionDecode is based on a model of the human brain's reward system [36], but this is just one way to explain the findings, and more research is needed for a deeper understanding.

The study [41] has some limitations that should be kept in mind when looking at the results. First, it only analyzed four figures from the FIQ, which means it didn't cover all possible examples. Also [41], while the AI chatbot claims it hasn't seen any training data after September 2021, it's hard to confirm this, and there might be a chance it had some exposure to FIQ-related information, but this is unlikely to have greatly affected its performance. Lastly [41], the results varied depending on the different figures used in the study.

Between 2018 and 2021 [41], the research utilized a Human-Action-Recognition (HAR) algorithm and the OpenAI GPT-2 language model to create AI-enabled artworks. The HAR model was trained on a dataset containing various human actions, which has since been expanded [41], but the researchers chose not to retrain their model despite these updates. This offers a new open problem, yet not solved, namely, using newer versions of these models might enhance the creativity and effectiveness of the artworks, particularly by incorporating live human actions instead of pre-recorded materials.

This study [47] examined how AI tools, like ChatGPT, can enhance Aesthetic Mathematical Experiences (AME) for teachers, but it has some sophisticated unsolved open problems, for example, some of the claims made are speculative and not definitive, meaning more research is needed to confirm the findings. Additionally, the collaboration between teachers and ChatGPT raises questions about the originality of the content created, as it may be difficult to distinguish between human creativity and AI-generated responses.

Some open problems have emerged from [54]. One issue [54] is that the model sometimes struggles to accurately create the requested context, which can happen if the training data didn't include enough examples of that context. Other problems [54] include changes in how the subject appears due to the context, overfitting to the original images, and difficulties with less common subjects, which can lead to inaccuracies or hallucinations in the generated images.

5|Conclusion, and Future Research Pathways

This study demonstrates the transformative potential of AI in abstract expressionist art, particularly in visualizing IMPFs prompts like Ismail A Mageed's. Through the integration of advanced techniques and symbolic abstraction, Leonardo AI proved capable of translating complex poetic themes into compelling visual narratives.

The recurring use of symbols such as hearts, water, and light showcased AI's ability to imbue artworks with deeper meaning, reflecting the emotional and existential undertones of the poem. While challenges persist in achieving greater diversity and abstraction, the collaboration between human creativity and machine intelligence reveals exciting possibilities for future artistic endeavours.

Future research could explore enhancing AI's symbolic interpretation capabilities, integrating adaptive models for greater stylistic variation, and examining applications in art therapy and education to further bridge the gap between textual and visual creativity.

Author Contributions

Ismail A. Mageed was responsible for ideation, composing poetic phrases, developing the theoretical framework, and drafting the manuscript, while Abdul Raheem Nazir handled implementation, experiment design, data analysis, and manuscript review. Both authors contributed equally to the revision and finalization of the paper.

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