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Creativity in AI-based systems

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Abstract:

Implementing the element of Creativity in AI-based systems has presented several challenges. This is primarily due to the fact that creativity is a dynamic and variable quality unique to humans. Hence, imparting creativity inside AI is a big challenge. The present research work seeks to discuss these challenges and reflect upon the many facets of creativity that need to be addressed for designing AI systems capable of creativity. As a consequence of this, it is believed that the implementation of artificial intelligence (AI) and the development of AI would lead to an increase in creative talents in order to better prepare humans to take advantage of opportunities and overcome problems. When humans consider the possibility that AI could have creative capabilities, it opens up new avenues for us to consider aspects of human creativity and the process of creation, some of which are successfully imitated by AI. These new avenues allow us to consider aspects of human creativity and the process of creating

Keywords:

Artificial Intelligence, Creativity, cognitive processes, forward-thinking, Spontaneous creativity, emotional creativity, using natural language processing

1. Introduction:

Creativity has a purpose that goes beyond its aesthetic or expressive components; it is also a tool that can produce fresh perspectives on inquiry and introspection, therefore it serves a role that is far broader than either of those. This is something that can happen on the level of the individual as well as the level of the social group. A work is considered to be creative if it is created with the intention of evoking a feeling in the viewer, regardless of whether or not that feeling is actually understood. Embodied cognition is utilised when one engages in the process of making art or engaging with art in order to engage with one's environment and to gain insight into other cognitive processes. This can be done when one is making art or engaging with art. This can take place when one is engaged in the process of creating art as well as when one is experiencing art [1]. If people are able to develop their creative potential, it will be beneficial not only to themselves but also to society as a whole. There will be many winners. It is impossible to conceive of people making any kind of development given the lack of possibility for them to do so. In point of fact, it is difficult to imagine any kind of advancement being made by humans. It is a widely held belief that it denotes the introduction of something that is both forward-thinking and inventive, as well as valuable to society, and that it goes beyond what is known and typically accepted. To put it another way, it is something that is exceptional in comparison to the norm. The social element, which involves acceptance by other people and adoption as the new status quo, is an important component that underpins the positive quality. This aspect is the important component that underpins the positive quality. It would appear that evolution gives more weight to the social aspects of creative endeavours, particularly those that are more beneficial to society. It is believed that the evolution of the human brain, including its size, neuroanatomical and neuro-functional configurations, and other aspects, was influenced by both biological and societal influences at various points throughout the course of the evolution of the species. These influences may have occurred at the same time or independently of one another. Art, because it is a kind of symbolic communication, can only be practised by humans because no other species is capable of doing so. It is hypothesised that art became a fully practised behaviour during a period of time when early human social groups expanded in size and complexity, and communication through language and art aided cohesion and survival. This was during a time when early humans lived in more complex societies [2].

2. Types of Creativity:

According to Arne Dietrich, the four different types of creativity are:

2.1. Deliberate and cognitive creativity:

People who are creative in a deliberate and cognitive way are interested in research and prefer undertaking various tests and inquiries in order to achieve their artistic goals. This is because people who are creative in a deliberate and cognitive way are more likely to achieve their artistic aims. This is due to the fact that individuals who are creative in a way that is purposeful and requires cognitive processing are more likely to be original. The portion of the brain known as the prefrontal cortex is responsible for extended periods of concentrated attention as well as the accumulation of information. This type of creativity is distinguished by extended periods of concentration as well as the accumulation of relevant information (PFC) [3].

2.2. Deliberate and emotional creativity:

The amygdala and the cingulate cortex are the areas of the brain that are in charge of controlling creative activity, both creatively and emotionally. Combining a reliance on logic and facts with emotional sensitivity is the hallmark of this sort of creative thinking. People who belong to this category believe that spending time alone is the best way to generate random "a-ha" moments of insight as well as creative inspiration, so they relish opportunities to spend extended amounts of time alone [3].

2.3. Spontaneous and cognitive creativity:

Both spontaneous and cognitive creativity is exemplified by a "eureka" moment, such as the one that purportedly sparked the development of Isaac Newton's theories on gravity. People who fall into this kind of creativity frequently find that they need to divert their attention away from the issue at hand and onto other things. The basal ganglia of the brain are responsible for activating unconscious consciousness at these specific times, which enables the prefrontal cortex to draw on its store of information and make connections. When the brain is triggered by an idea or an external inspiration, it produces solutions [3].

2.4. Spontaneous and emotional creativity:

The works of great artists, such as painters, authors, and musicians, often display aspects of emotional and spontaneous creativity. These characteristics can be found in abundance. The region of the brain known as the amygdala, which is in charge of processing emotions, is also responsible for producing epiphanies, which are also known as sudden flashes of inspiration.

A person can get the ability to look at a situation from an entirely new vantage point as a result of these sudden flashes of insight. Patience is the only thing that is required; there is no way to force or fabricate an insight; all that is necessary is time.

3. AI and Creativity:

Esling, Philippe & Devis, Ninon (2020) provided a new perspective on the question of creativity in the era of AI, by blurring the frontier between social and computational sciences. To do so, they relied on reflections from social science studies of creativity to view how current AI would be considered through this lens. As creativity is a highly context-prone concept, they underlined the limits and deficiencies of current AI, requiring us to move towards artificial creativity. They argue that the objective of trying to purely mimic human creative traits towards a self-contained ex-nihilo generative machine would be highly counterproductive, creating a risk of not harnessing the almost unlimited possibilities offered by the sheer computational power of artificial agents.

Rohrmeier (2022) addressed the notion of human and computational creativity, as well as the fundamental difficulties that face computational musical creativity, in their work. The focus of their investigation was on musical creativity. However, in addition to this, they investigated the philosophical conundrum of computational creativity as being suspended between algorithmic determinism and random sampling, and it proposes a solution from the standpoint that "creativity" is conceived of as an essentially functional concept that is dependent on a problem space, a frame of reference (such as a standard strategy, another mind, or a community), and relevance. This solution is based on the notion that "creativity" is conceived of as an essentially functional concept. On the basis of these issues, their research suggested that the general capability of music and its creation inherently demands general (artificial) intelligence. As a consequence of this, the research suggested that the problem of musical creativity in general is fundamentally one that cannot be solved by artificial intelligence.

Reddy (2022) concentrated on artificial everyday creativity by focusing on the inquisitive, joyous, and adjacent forms of everyday creation. This was performed by including hybrid materials that embrace alternative pedagogies of code and computing. The researcher created two unconventionally coded artefacts called Crypto Crochet-Key and Internet of Towels using the interdisciplinary design methodology known as "critical making." These artefacts engaged in conversation with artificial intelligence (AI) systems. In order to gain an understanding of

the material translation processes involved in the artificial everyday creativity practise, a creativity framework with four pillars was applied to the analysis of both artefacts. In light of the growing concerns regarding the role that AI may play in the spread of misinformation, bias, and discrimination, this research investigated the generative value of artificial everyday creativity as well as its limitations with the larger goals of civic data literacy and user empowerment in mind.

Plate and Hutson (2022) presented a model that can be adopted in postsecondary creative writing courses as a strategy to assist the learning and development of the students enrolled in those classes. This research sought to determine whether or not a recently developed proprietary form of natural language processing (NLP) is effective in enhancing students' knowledge of grammar as well as their abilities to write creatively. In order to conduct an analysis of the people who took part in the study, questionnaires, as well as questions with both closed and open-ended responses, were used. The participants acknowledged, in accordance with the findings, that the algorithm helped them acquire a deeper comprehension of grammar. On the other hand, the participants were not as open to receiving direction in increasing their creative abilities. It is vital to keep in mind that the textual artefacts that were given for the inquiry did not necessarily exhibit evidence of improvement as a direct result of the suggestions that were made by the algorithm. According to the findings, students find that using natural language processing (NLP) as part of the creative writing process is enjoyable; yet, the majority of the time, they used it to assist with grammar and syntax, much like they do with other language processing tools.

Oktradiksa (2021), studied strategies to maximise the potential of AI. The research concluded that Computers, when equipped with this technology, are able to complete a variety of tasks successfully by processing large amounts of data and managing patterns found within the data. As a result of this, it is hoped that the application of artificial intelligence and the development of AI will increase creative skills in order to better prepare individuals to take advantage of opportunities and overcome challenges in the era of a society that is 5.0.

Lee (2022) examined how creativity is dehumanized (and rehumanized) and how its labor-related aspects are hindered (and highlighted) in three recent developments in the understanding of arts, culture, and creativity: the creativity in AI, the creativity in everyday life, and the creativity in the creative industries. The production of art, whether by AI or by human beings, appears to be seen more as a process than as labor in the discussion on artificial intelligence's creative capabilities and its ability to simulate human producers. The research

showed that our conception of creativity is being simultaneously rehumanized and dehumanized by the ongoing development and deployment of AI in cultural and artistic production in the meantime. This has a dual effect. This is due to the fact that AI is capable of performing creative activities in ways that humans are unable to. According to the research When humans consider the possibility of AI having creative capabilities, it opens up new avenues for us to consider aspects of human creativity and the process of creation, some of which are successfully imitated by AI. These new avenues allow us to look further afield than the current economic paradigm. Because of this, we are able to broaden our perspective outside the traditional framework of economics.

Wingström, Hautala & Lundman (2022) made a contribution to the field of human sciences by conducting 52 interviews with AI-using computer scientists and new media artists located in Finland. These interviews were conducted in Finland. According to the findings of the study, creative work can be judged based on criteria that are eerily similar to those employed by scientists and artists. On the other hand, the part that AI plays in the creative processes that are carried out by the scientific community is quite distinct from the one that it plays in the creative processes that are carried out by the artistic community. AI is essential for the development of results that are reliable and accurate in the scientific community, while at the same time it enables artists to experiment and have fun with their work. A handful of artists, in contrast to the scientists, considered the work they did in collaboration with AI to be artistic in and of itself. Co-creativity may be able to describe the modern creative processes in this age of artificial intelligence (AI), and we believe that it should be the primary focus of any future research that is undertaken on creativity. Co-creativity may be able to describe the modern creative processes in this age of artificial intelligence (AI). The sentence that follows contains our suggestion in its entirety.

Birtchnell and Elliott (2018) evaluated the potential impacts that artificial intelligence (AI) might have on the creative economy that surrounds the production of music. One industry in particular, audio post-production, is going through a period of rapid upheaval as a direct result of the proliferation of AI and other forms of automation. This transformation is taking place in the audio post-production industry. This article, which draws on empirical research on AI in audio post-production, argues that there are contradictory conceptions of the prospective consequences of these new developments on human knowledge and digital abilities. These conceptions are based on different assumptions about how these new developments will affect human knowledge and digital abilities. The preceding citations of empirical research provide credence to the claims made in this argument. This research shed light on the transition that is

currently taking place in the field of audio mastering as a result of workers in the creative industries collaborating and competing with technological innovation that is driven by AI. This transition is taking place as a result of workers in the creative industries using AI.

4. Conclusion:

The debate of an earlier study on the subject brought to light the fact that since creativity is a notion that is highly dependent on its context, there are limitations and shortcomings in necessitating the development of artificial creativity. The philosophical conundrum of computational creativity is that it is suspended between algorithmic determinism and random sampling. Creativity is conceived of as an essentially functional concept that is dependent on a problem space, a frame of reference, and relevance. As a consequence of this, it is believed that the implementation of artificial intelligence (AI) and the development of AI would lead to an increase in creative talents in order to better prepare humans to take advantage of opportunities and overcome problems. When humans consider the possibility that AI could have creative capabilities, it opens up new avenues for us to consider aspects of human creativity and the process of creation, some of which are successfully imitated by AI. These new avenues allow us to consider aspects of human creativity and the process of creating. We believe that co-creativity ought to be the primary focus of any future research that is carried out on creativity and artificial intelligence (AI). Co-creativity may be able to describe the modern creative processes in this age of artificial intelligence (AI), and we believe that this ought to be the case.

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Top 10 Artificial Intelligence Technologies

1. Natural language generation
2. Speech recognition
3. Virtual agents
4. Decision management
5. Biometrics
6. Machine learning
7. Robotic process automation
8. Peer-to-peer network
9. Deep learning platforms
10. AL-optimized hardware



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