

Artificial intelligence's ability to process images

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Abstract. Penetration of technology into different fields and their dominion over them after a while is undoubtable. New technologies lure our souls and the dependency on them is inextricable once having tasted the fruit. We as a human easily addict to the convenient and comforting songs. As well as when they do our work for us in a more preferable and presentable way. This work was done to illustrate the artificial intelligence use in image processing. Its capabilities and issues are the key factors of the concerns of the work. Therefore, the work outlines the basic ideas behind artificial intelligence and its use in different areas and making accent on the capabilities of the technology when using tools powered by artificial intelligence to understand the meaning of the provided picture. Possible solutions are also described.

1 Introduction

As we delve into the realm of Artificial intelligence, we can see its vast and endless capabilities in different fields. Artificial intelligence is a modern revolution that transforms our well-established routine lives into an unimaginable futuristic world. The technology brings a simple idea. The idea that human capabilities might be mimicked and even outrun. The very idea was fantasy a few decades ago, only seen in movie. With the technological progress, occurrence of different methods and improvement of algorithms it was possible for the technology to emerge in the state it is now.

Artificial intelligence will defy the nearest future. Its capabilities allow it to penetrate almost to any field and if correctly used to level them up. It brings many possibilities. The vital fields are using artificial intelligence to the state that it is almost impossible for a common man to notice its application. It is so well embedded, and the realization of its use in some cases puts some people to unbelief. It is true that its use is spreading like well-built viruses, finding its victims and sending them to the shocking level. However, in this case meaning the positive impact.

The importance of artificial intelligence is dictated by its capabilities and its application. Therefore, the clear knowledge of the technology must be a well-known for its best application. The technology brings two different yet with the mirroring abilities sides. There are clear positive and negative sides. There is also mixed effect as well. From one angle, the use of technology can satisfy the user (any industry) and negatively effect, for example, the

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employee who works there. At the end, it does indicate some similar tendency as any other technology, but with the slightest hints [1, 2].

Its usability in different fields brings elevation of the system. The most notable changes it provided to the entertainment industry. It immediately locked itself in the core of tools used in the field, bringing them to the shocking state. These tools are capable of generating almost anything from text to videos. Of course, there are still some areas that lack quality and correctness. In general, its capabilities, in short time, transformed entertainment industry that backlashed negativity. Nonetheless, the following article will be focusing on studying the capabilities of artificial intelligence to process and understand the images.

2 The science behind processing images through artificial intelligence

The first step in this journey is to have an image ready, which can be taken through any convenient device that is capable of generating appropriate formats for the further analysis. The image selected then can be directly passed through different tools to enrich some parts and to eliminate some issues such as noise, blur, glitches and so on. The other case is to analyse in its raw state without preprocessing. Computer vision is used to extract patterns and points of different object that it will use later to understand the picture.

The next step is to utilize machine learning through various ways. It can be done by three methods: supervised, unsupervised and semi-supervised learning. Through these methods the algorithms learn to map input data through variation of labeling processes. Deep learning applying convolutional neural networks understands tasks starting from the small details and gradually figuring out more complex features in the image. Meaning, it will start from the scratch and move further up by learning piece to piece. Neural network architectures consist of convolutional layers, pooling layers, and activation functions, and can be fine-tuned using transfer learning. Transfer learning can be described as a feature that recalls what it studied earlier and, on that recall, constructs further improvements. The other step is to cut picture into segments (called segmentation process) to understand and analyse it more detail. There are many different steps and technologies used to analyse the image, but in more general way it is as explained above [3, 4].

3 Application of image processing

One thing is the capabilities of understanding the information on the images, and another its possible applications. Its application is vast and in demand. There are many fields that can benefit from this technology. Therefore, the following fields embed the technology to thoroughly examine the imagery: medicine, entertainment and agriculture.

3.1 Medicine

As we all know, there are many areas in medicine involved with image analysis. The image analyzing technology can be utilized for the processing of X-rays, MRIs, CT scans. The technology can be used to diagnose and monitor diseases. The enrichment of the technology allows its users to go more deeper in a sense of its provision of wider scope of results that can be collected. With the improvement on diagnosis, it can increase the correctness of the outcomes drastically [5].

3.2 Entertainment

Entertainment can be named as a field that introduced the capabilities of neural network to the masses. This is also the one that utilizes the technology the most compared to other fields. Application of the technology in this field is dramatic and diverse. The technology can be found in many different apps and software. It provides much more easiness to the users and flowless experience. Examples of such implementation can be found in almost every device that has cameras or software to process images. For instance, the features of the face is refined in real time by understanding and analyzing the image that been fed. Most of the time it is a frontal camera that utilizes such enrichment. Augmented and virtual realities also use image processing in real time to construct and augment the outcomes. There are many various applications, but will not be covered in this work [6, 7].

3.3 Agriculture

Agriculture is the sector that is thriving on using new technologies. Its first task is to withstand the pressure from the overpopulation and global warming. These issues put the sector under harsh environments that needs to be addressed before it gets worse. The real solution is utilization of new technologies and in this case the use of artificial intelligence. The use of artificial intelligence pushes this sector to the new level, of course with the combination of other technology. The use of image processing is also a pivotal part in agricultural sector. It enables the system to monitor and analyze the overall process without involvement of the workforce. It can be compared to mechanism that are powered by sight, that allows them to function without outer control. The technology will only improve and further transform the agricultural sector in the positive direction [8, 9].

4 Examples of the use

To understand how well the technology works, some analysis was done. DALL.E was used as an example. Three simple but related images were provided (Figure 1). The simple prompts were given. First one was about description. The tool described all three images correctly. By observing Figure 2 one can see the description. Then the tool was asked to more closely describe the images to find correlations. Overall, the outcomes were clear, except two detail. The tool suggested that the guy in the adidas t-shirt occurs in two images, which is in reality wrong. The second one was about the department where the event took place. The tool suggested that it probably will be geography department. The idea for that outcome might be the result of a map on the second image that conflicted the tool to think it has relation to the suggested place.



Fig. 1. provided images to the DALL.E.

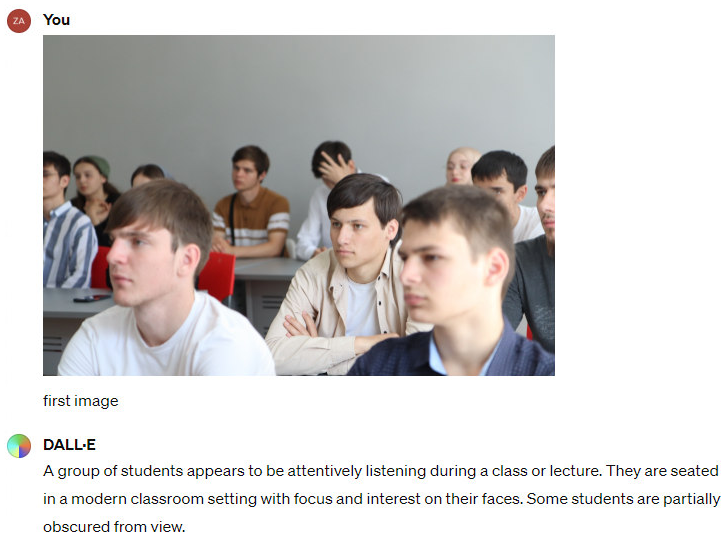


Fig. 2. The provided description to the image.

5 Future perspectives

Looking ahead, the future of image processing holds promising developments in diverse areas. In the medical field, there's a trajectory toward more advanced imaging techniques like 3D and functional imaging, coupled with artificial intelligence for improved diagnostics. Augmented and virtual reality experiences are set to become even more realistic and immersive, impacting education, training, and entertainment. Autonomous vehicles are expected to benefit from ongoing image processing advancements, enhancing object recognition and decision-making for safer transportation. Human-computer interaction will likely see improvements in gesture recognition and emotion analysis, influencing applications in gaming, healthcare, and smart environments. Image processing's role in environmental monitoring, particularly through satellite imagery analysis, will continue to aid resource management, disaster response, and climate studies. In robotics and automation, sophisticated systems capable of navigating complex environments and performing intricate tasks are anticipated. The evolution of smart cities will rely on image processing for traffic management, public safety, and urban planning. Security systems are likely to advance with facial recognition and behavior analysis. Personalized user experiences, quantum image processing, computational photography innovations, and the potential integration of image processing in brain-computer interfaces also mark exciting avenues for exploration in the future. These trends underscore the ongoing integration of image processing into various aspects of our lives, driven by technological advancements and evolving applications [9, 10, 11,12].

6 Conclusion

To conclude, the following work was done to show the abilities of artificial intelligence when dealing with images. Its capabilities over analysis and understanding was the main focus. Artificial intelligence use in modern time is vast, and its wide application is due to its capabilities to be implemented almost everywhere. Similarly, the technology is capable of

distinguishing the different parts of the images. Thus, the technology is used in different fields and areas involved with the image processing method. Some of which were covered in this work, such as its use in medicine, agriculture, and entertainment. The technology is a promising technology not just in the image processing field, but in many others. Some possible outcomes were also discussed in this work.

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