**Module 1: Option #1**

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CSC515-1: Foundations of Computer Vision

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The advance of computer vision has grown significantly from its inception and there are many times where computer vision is equal to or greater than human perception. Throughout this project there will be examples of when computer vision has been successfully implemented and there will be others where it demonstrates a significant problem. Within the world of art, there have been examples of computer vision being utilized to create art, and there are other examples of where arts history can be revealed. Computer vision has significant implications in regards to the future domestication of new found land and resources. There are conscious and subconscious biases that affect the way new projects in computer vision can fail, in these different cases, it should not be used.

**Computer Vision and Art**

“Computer vision is the subcategory of artificial intelligence that focuses on building and using digital systems to process, analyze and interpret visual data” (Techopedia.com, 2022). “The main task of human perception is to amplify and strengthen sensory inputs to be able to perceive, orientate and act very quickly, specifically and efficiently” (Carbon, 2014). The two preceding definitions demonstrate the similarities between the concepts of human perception and computer vision. These two concepts can complement one another in reality. In the world of art, styles and textures that may not be readily known to the majority of art enthusiasts, there can be a benefit to the entire art world if computer vision is fully realized to learn the depth that artwork can have. Determining the creator of historical paintings based on the styles used has been shown to be a possibility with a proper algorithm trained by paintings (Van Zuijlen et al., 2021). Luo et al., (2022) suggested that the usage of computer vision, along with unmanned aerial vehicles, can be used to discover suitable land and river locations that would be otherwise inaccessible due to dangerous conditions or regularly unavailable geography. Each of these ideas can further human advancement, the former advancing the creative development of human art, and the latter giving the ability to domesticate appropriate landscapes without futile exploration at the risk of human life.

**Computer Vision and Enhanced Living**

Considering the relationship between human perception and computer vision, these two should remain in conjunction, as long as the model to be used is appropriately trained and thoroughly tested. With regard to the medical field and misdiagnosis, there are roughly 26 percent of people diagnosed incorrectly in the United States (Levine & Bleakley, 2011). With this level of error, had a computer vision model been used effectively, there is reason to believe that with a second set of “eyes”, or a computer vision model, there would be more accurate diagnoses. Simply implementing a model into the medical field, there could be lives and livers saved or spared to inaccurate medicines and procedures. The idea of utilizing both medical professionals’ opinion and computer vision, the medical field could increase the accuracy of medical diagnoses and procedures.

**Computer Vision and Approachability**

Computer vision can lead to inaccuracies as well, due to human conscious or unconscious biases that plague all of humanity. With facial recognition software that is used in robotics to interact and approach people in a human way, there are inherent limitations related to this work. As with human interaction, those that are approached or seem approachable are determined as a first impression (Junior et al., 2021). First impressions are derived from the subjective nature of an individual’s attraction as well as facial cues (2021). Robotics would not approach unattractive individuals or those with facial cues that determine whether or not someone is approachable. With this sort of subjective bias, imagine we were using this software to determine who is at risk of becoming a criminal, this would lead to unfair judgements and treatments. This could lead to a predictive program that would determine whether or not someone is going to do a future crime. There have been many science fiction shows and movies that describe this exact potential problem.

**Computer Vision and Biases**

Although using a fair and unbiased set of data is of great importance, it is not the reality that we live in. “Many truly offensive and harmful categories hid in the depth of ImageNet’s Person categories. Some classifications were misogynist, racist, ageist, and ableist. … Insults, racist slurs, and oral judgements abound” (Lazzaro, 2021). The truth behind many of the data sets used is that they are not scrubbed prior to use, they are generally accepted as enough, which leads to hidden problems that only become apparent when test results are delivered. I have a friend who judged racially by an AI robot patrolling a store, this robot literally followed him from the moment he walked in the store to the second he left, simply because he is black and was walking into a store. The fact that this is an issue with the data set, can be mitigated, but individuals with access to the data set can change whatever data they would like to fit whatever prejudices they may have.

**Conclusion**

To conclude, computer vision and human perception are capable of complementing one another. Within art there are many different ways that computer vision can assist in the deeper understanding of art history, it may even be able to create unique artwork that can compete with human artists. The medical field can reduce the number of misdiagnosed patients with the help of a second look from computer vision. Dangerous landscapes can be evaluated for potential domestication without having to sacrifice lives in an attempt to determine whether or not the land is suitable. There are also issues while using computer vision, many of these issues lie within the biases of data sets involved. In conclusion, the use of computer vision with human perception can be beneficial, but it can also be harmful, we must be cognizant of the data involved.

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