The Mathematical Analysis of Claude Monet's Impressionistic Masterwork —Haystack

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The purpose of this project is to analyze whether Gaussian Mixture Model can be used to judge the time of a day and weather in a Monet's Haystack. To achieve this, I use python to transform pixel colors into numbers through RGB and HSI color model. By using Gaussian Mixture Model to analyze these numbers I established every haystacks' characteristic numbers of the model's average number and standard deviation, and calculated the distance between one another to determine the similarity between two haystacks. Then I can finally judge the time and weather of a Haystack painting by comparing its similarity with the standard ones. I use 7 out of 24 haystacks such as Stacks of Wheat (End of Summer, 1890/91), Haystacks (Late Summer, 1891),Haystacks at Giverny (1884)……My judges by Gaussian Mixture Model are all same with the actual situation. Conclusion is that, by using Gaussian Mixture Model, I can get the characteristic numbers to judge the time and the weather in Monet’s haystack. Using mathematical model and color models, my research digitalized colors in oil paintings for the first time and provide Arts a new method to analyze the paintings of impressionists, it can also be applied to judging whether a painting is forged or not in the future.

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