

CS464: Introduction to Machine Learning

Project Proposal

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Problem Statement

The main identified issue is that there is an absence of a commonplace application for art movement recognition by museum-goers. This issue is further complicated by the fact that in museum databases, accurate classification of paintings into styles is a bottleneck. Furthermore, multiple machine learning algorithms are not tested in this domain, for which a standard can be found.

Approach

Our approach is to tackle the problem using different machine learning algorithms. The methods which will be used are: k-Nearest Neighbour (kNN), Convolutional Neural Network (CNN), Multi-Dimensional Long Short-Term Memory (LSTM). We are going to compare the accuracy of labels generated by each algorithm for the same test input.

Data Description

While doing this project, the aim is to match the artwork with the movement it belongs to. In order to do that, we're planning to benefit from "wikiart.org" for obtaining necessary data. WikiArt features 150.000 public domain and protected artworks by 2.500 artists and 149 art movements [1]. As it may affect accuracy, the reliability of the content in the website is ensured by steady control of the updates. The artworks may have different sizes so we're going to resize them to obtain similar sizes. The features such as colors, brushes etc. are going to be evaluated. WikiArt covers many visual arts so the data is useful and suitable for our project.

Evaluation

Mainly we will test the results for one artwork from a known art movement, additionally testing results for several artworks from a specific art movement will be carried out. We will use cross-validation and in conjunction with the other project group that works on art movements, test data will be exchanged.

Projected Workload

Team members will participate together in all stages of the project in order to have experience in all of them. In total, we are planning to allocate 5 hours for data extraction and 5 hours for feature extraction. 35 hours will be allocated for the implementation of different algorithms: 10 for kNN, 13 for CNN, 12 for LSTM. 5 hours will be allocated for data testing and evaluation.

Follow-up on Presentation Feedback

- Additional time is added for deciding on features to be extracted in the work division section.
- In order to tackle the problem of an imbalanced dataset, we will be using over-sampling, under-sampling, and bagging techniques.
- We addressed the issue of different image dimensions by downsizing larger images and create a homogenous image.
- We will limit the art movements to the ones existing in training data sets.
- We will use special software to crawl and download WikiArt data.
- We will use the other group's training data to test our algorithms.

[1] "About". <https://www.wikiart.org/en/about> . [Accessed: Oct. 17, 2017].