



Artistic Movement Recognition

Classifying Paintings by Art Movement

Motivation

- alter digital images to replicate an art movement
- label of unsigned paintings
- improvements in semantic categorization

Overall, a hard challenge because the difference between various movements is subtle and not easy to measure







Datasets

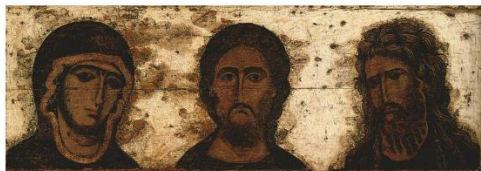
WikiArt (85000+ images - 27 art styles)

- more exhaustive
- weak annotations
- highly imbalanced
- many duplicates

Pandora8k (18038 images - 18 art styles)

- labels were verified by art experts
 - the classes are well distributed
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Pandora8k Dataset



Byzantine



Early Ren.



High Ren.



Rococo



Romanticism



North Ren.



Baroque



Realism



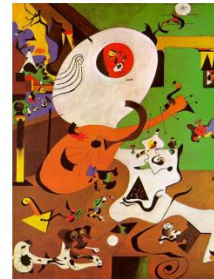
Impress.



Post Impr.



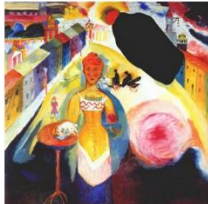
Symbolism



Surrealism



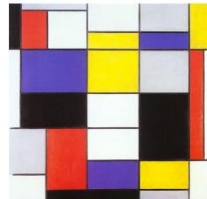
Fauvism



Expressionism



Cubism



Abstract



Naive art



Pop art

Metrics

$$\text{Accuracy} = \frac{TP+TN}{TP+TN+FP+FN}$$

Precision and Recall

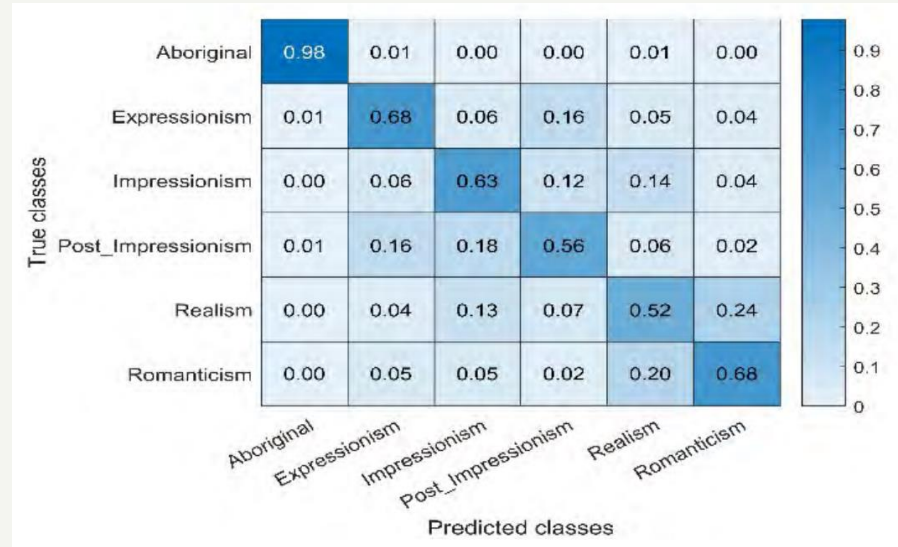
- precision measures the accuracy of positive predictions made by the model

$$\text{Precision} = \frac{TP}{TP+FP}$$

- recall measures the ability of the model to identify all relevant instances

$$\text{Recall} = \frac{TP}{TP+FN}$$

Confusion Matrix



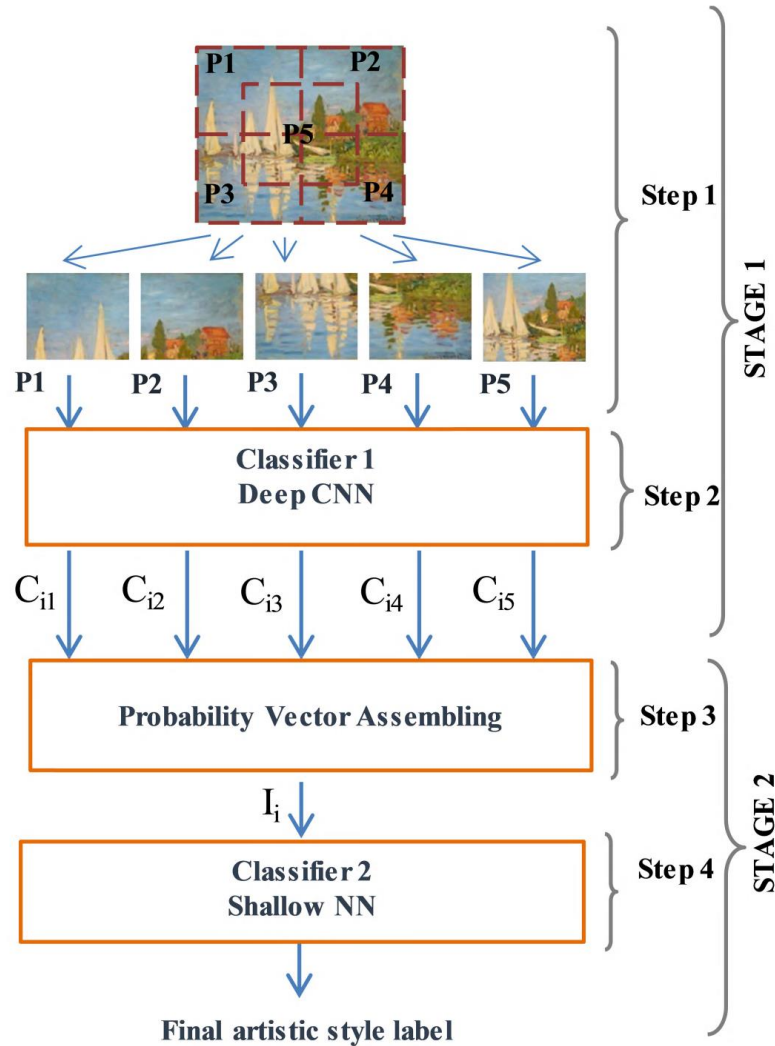
Models

- fine-tuned Resnet50 - 62.1% (2018)
- pHot + CSD ensemble of SVM - 63.9% (2018)
 - feature descriptors to extract features
 - color structure descriptor (CSD) for color
 - pyramid histogram of topographic descriptor (pHoT) for texture and composition
 - majority vote of SVMs to decide the final label
- two-stage deep learning - 77.53% (2019)

Two-Stage Deep Learning Model

First stage - deep convolutional neural networks (DCNN) pretrained on ImageNet

Second state - shallow neural network (SNN)




Transfer Learning

Transfer learning allows the adaptation or reuse of a network model that has been trained for a specific task using a very large dataset to perform a new, related task for which only a small datasets available





References

1. Pandora7k Dataset
 2. Feature descriptors with ensemble of SVM and Pandora18k Dataset
 3. Best model with feature descriptors with ensemble of SVM
 4. Two-Stage Deep Learning Approach
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