THE GALLERY OF CALLIGRAPHY

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Introduction

- Chinese calligraphy has been developing along with Chinese history. After a long time of evolution, it now consists of five types of fonts: seal, clerical, cursive, regular and semi-cursive.

Five styles of the Chinese character ”永”

Objectives

- Explore the connections between different styles of calligraphy.
- Analyze and validate the evolution of calligraphy.
- Analyze the relationships between calligraphers.

Details of Data

- Collect Chinese calligraphy images from the Internet.
- Each class contains 10 images of one style and one calligrapher.
- Crop the images to the same size (resolution: 440*440) and implement the binarization.
- Prepare two training datasets. One contains 47 classes, and the other is enlarged to 74 classes.
- Below is an example of one class:

Regular characters by Wang Xizhi, in Jin dynasty

Overall Workflow of Study

Collect data and form two datasets.

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Use Siamese neural network to generate dissimilarity matrix.

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Apply different community detection algorithms to detect community.

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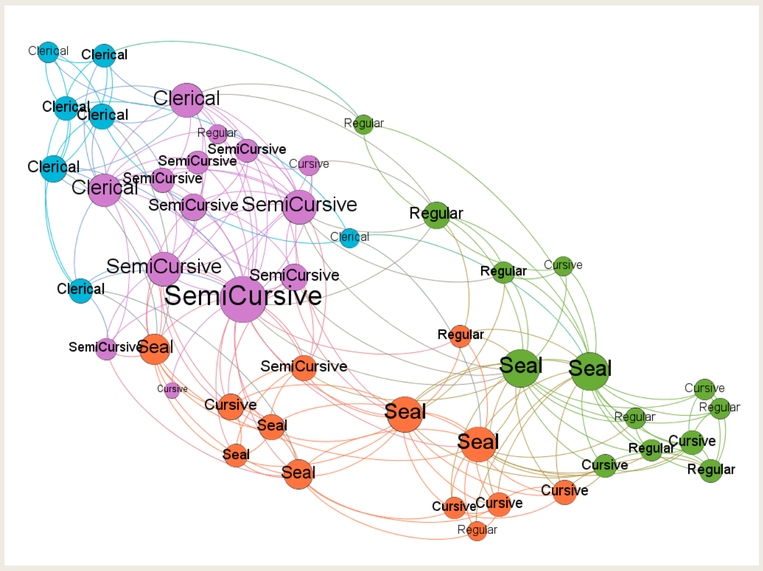
Do the visualization and analyze the results.

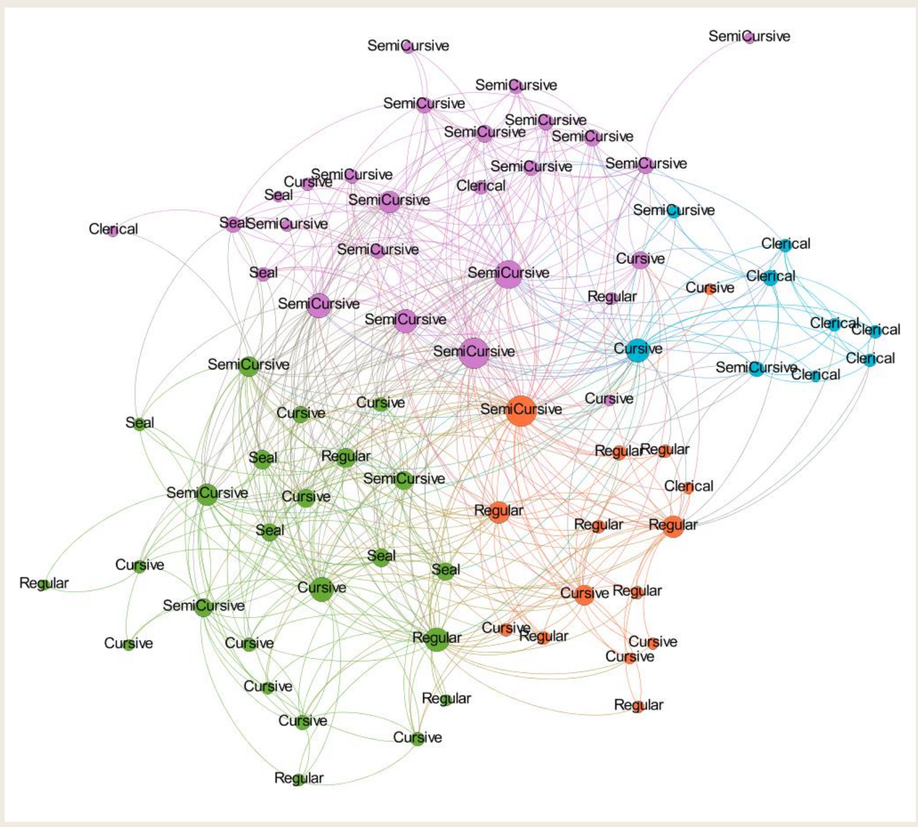
Community Detection

- Try three community detection algorithms: Girvan-Newman, Markov Clustering, and Louvain Algorithm.
- The parameters tuning depends on the modularity and the distribution of the communities.
- After comparison, we eventually chose the Louvain Algorithm.

Visualization & Analysis



Graph of the 47 classes by Louvain algorithm



Graph of the 74 classes by Louvain algorithm

- Each color represents one community. Both datasets are clustered into 4 communities through Louvain algorithm.
- As expected, vertices of the same styles tend to be in the same community.
- Even some classes belong to the same style, they can be clustered into different communities because of historical factors, such as evolution and revolution.
- Classes of different styles may be clustered into the same community. For instance, the evolution of the seal script in Qing dynasty made the style more similar to the cursive script. Therefore, many seal script fonts are clustered with the cursive script fonts.
- The newly added classes in the 74 classes can influence the clustering of the 47 classes. For example, since Chu Suiliang, a calligrapher, had studied the regular calligraphy of Ouyang Xun and Wang Xizhi, when the regular script of Ouyang Xun was added, the regular script of Chu Suiliang moved to the community with those two calligraphers.

Conclusion

By utilizing community detection to study calligraphy history, we can gain new perspectives to classify calligraphy instead of traditional classification.