ISSN 2436-5408 (Online)
ISSN 1346-2601 (Print)

Review of the 95th International ARC Seminar
——Understanding Japanese Humanities through the Lens of Machine Intelligence

Jiayun Wang
(PhD. student, Graduate School of Information Science and Engineering, Ritsumeikan University)
E-mail gr0278vx@ed.ritsumei.ac.jp

1. Introduction

On the 95th International ARC Seminar[1], Dr. Yingtao Tian from Google Brain Tokyo shared his research and perspectives in a presentation titled "Understanding Japanese Humanities through the Lens of Machine Intelligence". This article is a review of his presentation, including the main ideas and additional explanations for easier understanding.

In this presentation, Dr. Tian introduced their release of two datasets of faces in Japanese artworks, ARC Ukiyo-e Faces Dataset[2] and KaoKore Dataset[3], as well as the studies of them. The following of this article will introduce these two datasets respectively.

2. ARC Ukiyo-e Faces Dataset (AUF Dataset)

2-1. Dataset Description

The AUF dataset presents a large-scale (>10k prints, >20k faces) and high-quality Ukiyo-e image dataset, with the corresponding metadata provided by ARC, and automatically extracted facial landmarks, color separation and line sketch. All the sources can be extended to another public Ukiyo-e faces dataset[4].

In the dataset, 17 metadata fields such as title, painter, format, etc. are included. All the metadata values are created by domain experts.

The facial landmarks are obtained by automatically recognizing the faces from the original Ukiyo-e prints, then automatically inferring the possible rotated bounding boxes. The facial landmarks have the potential to help with tasks such as face recognition (painter recognition and Kabuki actor recognition) that are important for Ukiyo-e humanities research.

Color separation in AUF dataset is created by a soft color segmentation tool. This provides an idea to recolor the discolored Ukiyo-e prints.

Creativity is an emerging topic in the field of machine-generated arts. The well-extracted line sketch data of Ukiyo-e prints can be used directly and efficiently in such tasks.

2-2. Studies of AUF Dataset

Towards the face recognition on AUF dataset, considering the quality of face landmarks, and inspired by an existing work of quantitative analysis of Kabuki actor portraits, studies of the angle features that are formed by filtered face landmarks are done.

One of the study results is shown in Fig. 1. The figure shows the clear separation of painters Hirosada and Kogyo, but unclear separations of the other painters, which indicates the difficulty for nowadays image deep learning model to do painter classification task on the current dataset. This could be a challenge for further research.

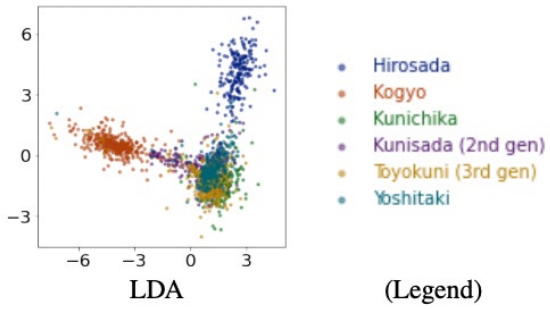

Fig. 1. The LDA visualization of the angle features. The faces painted by Hirosada and Kogyo are separated clearly.

3. KaoKore Dataset (KK Dataset)

3-1. Background

The Collection of Facial Expressions[3] was first created for comparative style study in the context of art history research.

However, the original data was created by the IIIF Curation Platform, which is not designed for machine learning in terms of data format, image size and attribute values. To bridge this gap, the KK dataset refined the format and build data loaders into an easy-to-use way.

3–2. Dataset Description

KK dataset contains face image files, as well as two sets of labels (gender and social status). Fig. 2 shows an example of the KK dataset. Three different versions differed by image amounts are provided. The subsequent studies are based on the first version of the KK dataset.

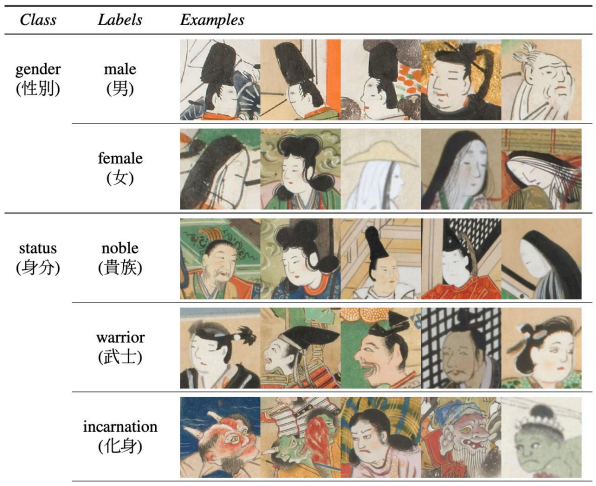

Fig. 2. In the KK dataset, labels defined by art history experts are assigned to cropped face images. Each face image can have multiple labels.

3–3. Studies of KK Dataset

Supervised machine learning tasks of gender and status classification are conducted on the KK dataset. Among the seven popular neural networks that are used in the experiments, the Inception-v3 model achieved the highest gender classification accuracy of 96.58%, and the ResNet-34 model achieved the highest status classification accuracy of 84.82%. The results suggest the possibility to improve the classification accuracies through better neural network architectures.

Two types of creativity applications are also applied to this dataset. One is Ukiyo-e style face image generation that was produced by the StyleGAN model. Another one is painting stroke generation that was produced by the intrinsic style transfer model and the learning to paint model. All the results demonstrate that the varieties in this dataset are well captured, and the contribution for the easier comparison of style studies.

4. Conclusion

This article briefly gives a summary of Dr. Tian's presentation, states basic information of two Japanese artwork face datasets, and highlights the contributions and challenges of the research.

[Annotations]

1) The 95th International ARC Seminar was held on December 8, 2021 (Wed), online. https://www.arc.ritsumei.ac.jp/e/news/pc/009275.html.
2) ARC Ukiyo-e Faces Dataset is public on GitHub: https://github.com/rois-codh/arc-ukiyoe-faces/
3) KaoKore Dataset is public on GitHub: https://github.com/rois-codh/kaokore.
4) https://www.justinpinkney.com/ukiyoe-dataset/
5) Collection of Facial Expressions can be accessed from: http://codh.rois.ac.jp/face/iiif-curation-finder/

[References]

Tian, Yingtao, Tarin Clanuwat, Chikahiko Suzuki, and Asanobu Kitamoto. Ukiyo-e Analysis and Creativity with Attribute and Geometry Annotation. arXiv preprint arXiv:2106.02267. 2021.

Tian, Yingtao, Chikahiko Suzuki, Tarin Clanuwat, Mikel Bober-Irizar, Alex Lamb, and Asanobu Kitamoto. Kaokore: A pre-modern Japanese art facial expression dataset. arXiv preprint arXiv:2002.08595. 2020.

Suzuki, Chikahiko, Akira Takagishi, and Asanobu Kitamoto. "Collection of facial expressions" with IIIF Curation Platform-Close Reading and Distant Reading for Style Comparative Studies. Proceedings of IPSJ SIG Computers and the Humanities Symposium. 2018. (in Japanese)

Murakami, M., and Urabe, J. A Quantitative Analysis of Portraits of Kabuki Actors. Proceedings of the Institute of Statistical Mathematics. 2007.