

Customized Image Aesthetics Assessment Method and Applications: Literature Review & Proposal

Presenter: Ke Siyun

Contact: garfield.ke@connect.um.edu.mo

Supervisor: Shu Kong



Slides

Summary of the Proposal



Objective:

- - Develop a customized IAA model for specified images (e.g. postcard scanning).
- - Attempt user profiling with aesthetics patterns.

Method:

- - Use subjective evaluation (e.g. user-generated 'likes') as aesthetic scores.
- - CNN

Applications:

- - Potential uses in social media, e-commerce, and personalized recommendations.

Introduction



Overview:

- - Image Aesthetics Assessment (IAA) aims to rate the aesthetic quality of images.
- - Traditionally subjective and conducted manually, but automated techniques are gaining importance.

Importance:

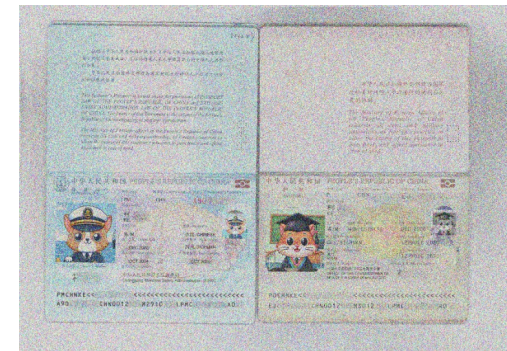
- - Automated IAA can enhance user experience in various fields like social media, e-commerce, and personalized recommendations.

Background -IQA



Image Quality Assessment

- Objective approaches.
- Based on image quality measurement, e.g. histogram, blurriness, noise etc.



Background -Quality vs Aesthetics



Image Aesthetics Assessment

- Subjective process.
- Evaluate element balance, color harmony, etc.
- Involve personal feelings.
- Might require human evaluators.



Objectives



- Model Development:
 - Creating an IAA model for (customized) images.
 - Predicting aesthetic scores based on user given scores (e.g. 'likes').
 - Enabling automatic scoring for new uploads.
- Application (tentative):
 - Utilizing aesthetic scores to generate user profiles
 - Maintaining a recommendation sys based on aesthetic related user profiling.

Previous Works



Early approaches:

- Rule-based Methods .
- Statistical Models
- Machine Learning with Handcrafted Features

Non-deep-learning approaches, serve as background of current deep learning models.

Previous Works - traditional



Rule-based Methods

- Predefined rules based on principles of art and design
- **Example:** Matsuda, Y.: Color Design. Asakura Shoten, Tokyo (1995)
a rule-based model that widely mentioned in many color harmony studies

Previous Works - traditional



Statistical Models .

Extracting statistical features from images

e.g. *an image with a balanced color histogram and smooth texture*
might be rated *higher in terms of aesthetics.*

*Tang et al. Color harmonization for images. - A **panel regression** model*

Previous Works -traditional



Machine Learning with Handcrafted Features

Pre-deep learning eras – traditional ML algorithms?

SVM, Random Forests etc.

still relies on handcrafted (predefined) features

Previous Works -traditional



Handcrafted (predefined) features (...Continued)

- color contrast,
- saturation,
- sharpness,
- symmetry
- etc.

Automatic aesthetic detection?

Previous Works –Deep Learning



IAA Overview:

- - IAA traditionally involves subjective ratings.
- - Early works used Image Quality Assessment (IQA) techniques. (histogram, etc.)

Advancements:

- - Recent techniques include deep learning features to capture aesthetic qualities.

Previous Models:

- - [1] Ying Dai's ensemble CNN models.
- - [2] Yubin Deng et al.'s experimental survey.
- - [3] Shu Kong et al.'s Photo Aesthetics Ranking Network.

Previous Works –Deep Learning



[3] Shu Kong et al.'s Photo Aesthetics Ranking Network.

- Used CNN to rank photo aesthetics.
- Based on aesthetic scores and meaningful attributes assigned by multiple human raters
- achieved 77% accuracy on AVA (an aesthetic dataset, highest -83%)

Previous Works



[3] Shu Kong et al.'s Photo Aesthetics Ranking Network.



Methods (Proposed)



Introduction to some models (involved in current IAA papers)

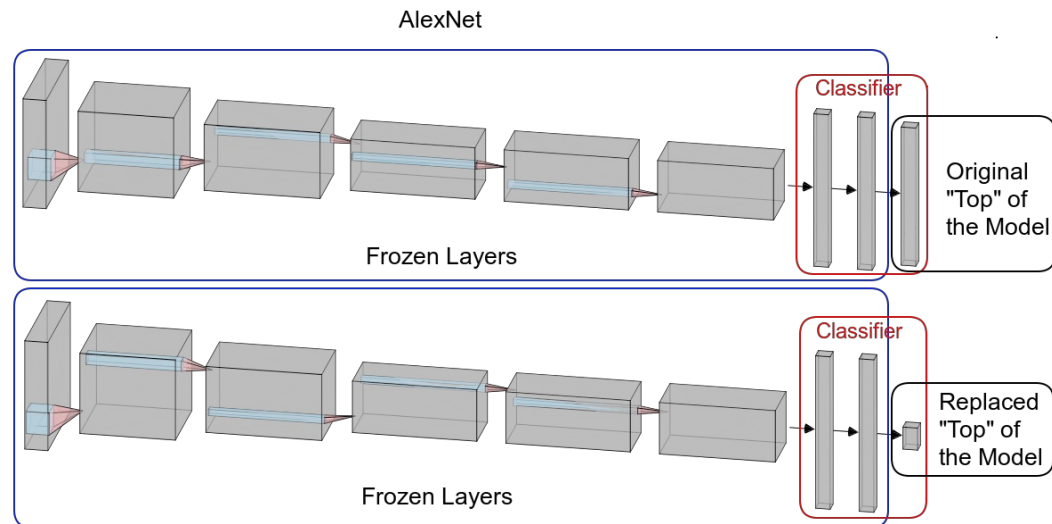
(AlexNet) S. Kong, X. Shen, Z. Lin, R. Mech, and C. Fowlkes, “Photo Aesthetics Ranking Network with Attributes and Content Adaptation,” Computer Vision – ECCV 2016.

(Multiple models’ ensemble) Y. Dai, “Building CNN-Based Models for Image Aesthetic Score Prediction Using an Ensemble,” Journal of Imaging, vol. 9, no. 2, p. 30, Feb. 2023.

Methods - AlexNet



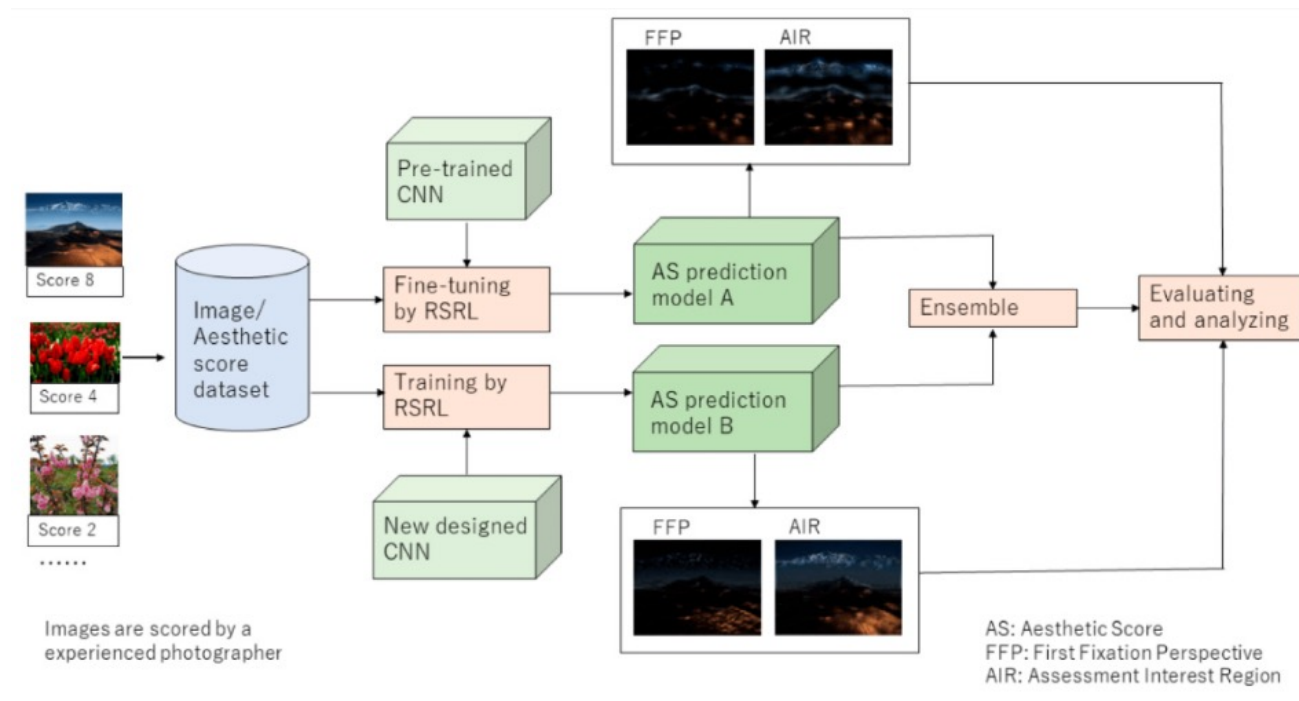
architecture:



Methods –an ensemble



Ensemble IAA models (AlexNet, ResNet, & EfficientNet)



Practical Experiment (Proposed)



Experiment:

- - Using postcard cases to test the model's capability.

Customization:

- - Investigating the suitability of customized data (e.g. postcard) for IAA models.

Limited Ratings:

- - Exploring training methods with limited aesthetic ratings.

Proposed Experiment -Model



Development:

- - Convolutional Neuron Networks (AlexNet?)
- - Building on [3]'s work with a focus on postcard images.*
 - * Under discussion, might outdated
 - * Try recent state-of-art works

Customization:

- - Tailoring the model to specific tasks.

Data Source:

- - Benchmark datasets
- - Using images from Postcrossing.com.

Proposed Experiment - Data



- Benchmark datasets:
 - Aesthetics Quality Assessment on AVA
 - Aesthetics and attributes database (AADB) dataset
- Customization/Test/Application:
 - Postcrossing.com*, user 'likes' as score

*Introduction follows

Applications



Postcard Community:

- - Automated rating and personalized recommendations.

Broader Uses:

- - Potential applications in social media and e-commerce.

Examples:

- - Enhancing content recommendations and assessing product images.

Application –Case Study



Experimental application with an online postcard community - *Postcrossing*:

- A postcard exchange website.
- Users may post the images of their sending/receiving postcards.
- Other users may rate the postcard by clicking a "like" button.
(# of “like” - aesthetics "score"?)

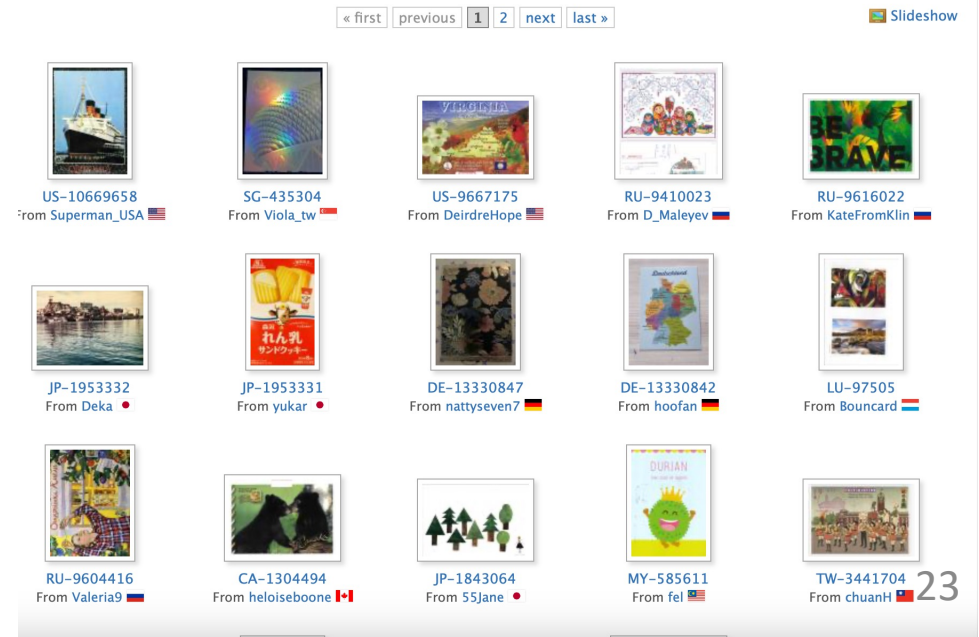
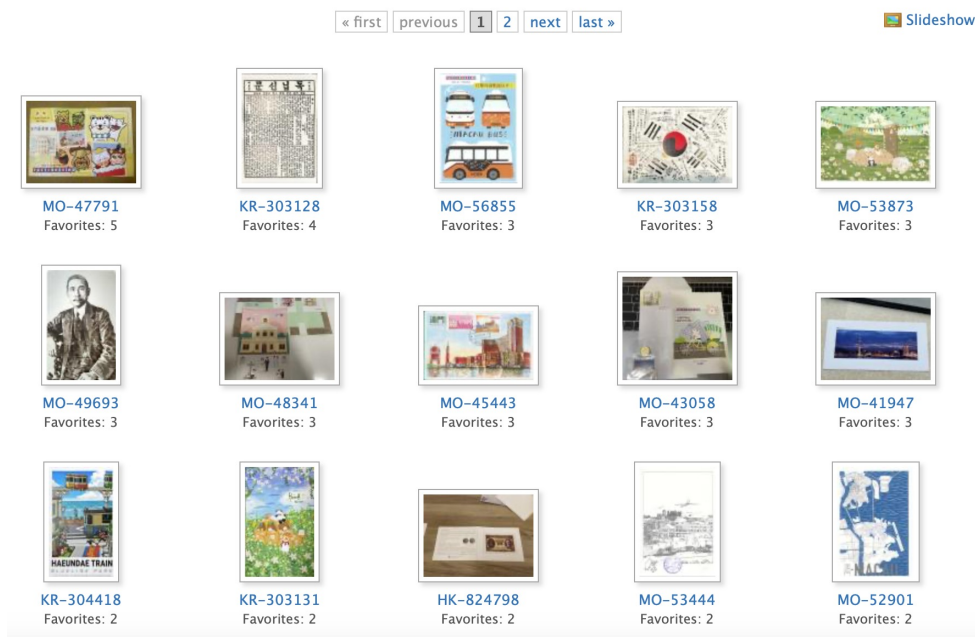
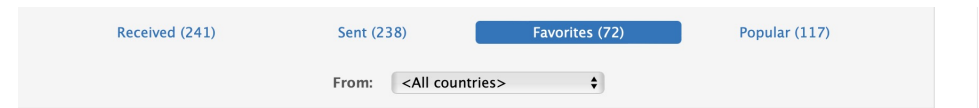
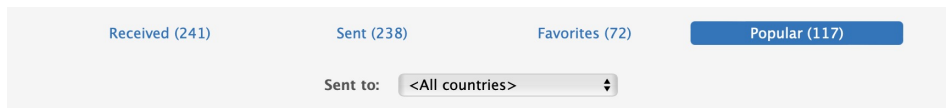


Postcrossing -Explained



Users give **ratings** to postcards
images

Ratings given form **one's aesthetics
preference**



Conclusion



- Proposed Models:
 - CNN
 - (working on ...)
- Dataset
 - AVA, AADB
 - Crawl from Postcrossing
- Goals:
 - Develop a customized IAA model
 - Explore practical application with aesthetics patterns.

Ethics Discussion



Source of data (Postcrossing):

- Ownership and Control: Retained by users who upload images. Both senders and recipients can upload, modify, or delete.
- Community Guidelines: Only emphasized ethical standards, (e.g. avoiding hate speech, inappropriate imagery),.
- Copyright Status: no explicit copyright statements (commercial, Creative Commons, or private?)

Ethics Discussion



Robots.txt from Postcrossing explicitly restricts:

- (some search engine / photo farms crawlers) to access uploaded images.
- (third party / self-implemented crawlers), only restrict access to private domains on this website.

```
###
# postcrossing.com robots.txt file
#
# NOTE: Entries in robots.txt don't inherit from '*'. Or not all bots
# know how to anyway, hence the repetition
###

User-Agent: *
# only the right user can open it, so stop doing 403's
Disallow: /travelingpostcard/
Disallow: /user/*/traveling
Disallow: /user/*/gallery/popular
Disallow: /user/*/map
Disallow: /pm/send/
Allow: /
```

Fair use: this dataset may be crawlable for academic use, but might not be open accessible.

References



- [1] Y. Dai, “Building CNN-Based Models for Image Aesthetic Score Prediction Using an Ensemble,” *Journal of Imaging*, vol. 9, no. 2, p. 30, Feb. 2023.
- [2] Y. Deng, C. C. Loy, and X. Tang, “Image Aesthetic Assessment: An experimental survey,” *IEEE Signal Processing Magazine*, vol. 34, no. 4, pp. 80–106, Jul. 2017.
- [3] S. Kong, X. Shen, Z. Lin, R. Mech, and C. Fowlkes, “Photo Aesthetics Ranking Network with Attributes and Content Adaptation,” *Computer Vision – ECCV 2016*.

...

...

...

Q & A



FAQs

Q: What could be the format of an aesthetics score?

A: Similar scores in current studies could be either continuous score or category labels.

Q: Why did you remove your previous introduction about “Recommendation sys” in this report?

A: Currently, I found it to be just a practical application case in a very limited scenario, so I decided to leave it out to focus more on the core methodologies and broader applications relevant to our discussion.