COSE474-2024F: Final Project Proposal
"Training deep learning models for photo-based personal color suggestions"

Hanjun Park

1. Introduction

Personal color analysis is a task that requires expertise and experience, and it is difficult for many people to find their optimal color without the help of experts. Accordingly, it is necessary to develop a deep learning-based system that automatically suggests personal color by analyzing person photos. These systems can help users easily discover colors that suit them and make fashion and beauty choices more effective.

2. Problem definition & chanllenges

2.1. Problem Definition

The goal of this project is to develop a system to automatically analyze and propose personal colors from person photographs by leveraging pre-trained deep learning-based models (e.g., ResNet, EfficientNet, etc.). It aims to build models that maintain high accuracy even in various environments.

2.2. Challenges

data diversity: Datasets for personal color analysis should include different races, skin tones, lighting conditions, etc.

Accurate facial recognition and feature extraction: accurately extracting and analyzing various facial features such as skin tone, hair color, and eye color is a technically complex challenge.

3. Related Works

Existing studies have attempted to analyze personal colors by utilizing computer vision and machine learning technologies. For example, a system has been developed that analyzes face images to classify skin chromaticity distribution and recommend colors accordingly. Recently, deep learning models, especially convolutional neural networks (CNNs), have been utilized to enable more sophisticated color analysis and recommendations. However, studies that fully consider the constraints such as lighting conditions are lacking, and there are limitations in increasing the accuracy of personalized recommendations.

4. Datasets

- Personal Color Classification (PCC) Dataset

- Kaggle, Github, etc...

5. State-of-the-art methods and baselines

- **Comparison target:** Recently announced personal color analysis models (e.g., Transformer-based models, image generation models using GAN, etc.)

- **Attribute:**

  - **classification accuracy:** Accuracy assessment of personal color classification using accuracy, F1 score, confusion matrix, etc

  - **Model Efficiency:** Evaluate the complexity of the model by number of parameters, amount of computation (FLOPs), etc

  - **inference rate:** Measure images per second (FPS) to evaluate real-time processability

6. Goals

Model development: Leveraging a pre-trained CNN-based vision model, we build the foundation of the model to automatically analyze and propose personal colors for person photo input.

Performance Improvement: Aim to achieve significant performance improvements compared to existing personal color analysis models. In particular, we want to achieve competitive results in terms of accuracy.

7. Schedule

Week 9-11: Research related literature, collection of datasets and Data preprocessing

Week 12-13: Model Implementation and Initial Experiments

Week 14-15: Model Optimization and Performance Evaluation

Week 16: Analysis of results and final report