Project Proposal

Title
Gender and Ethnicity Classification and Generation using Deep Learning in Heterogeneous Face Recognition

Abstract

Soft biometric traits are physical, behavioral and human characteristics such as gender, ethnicity, height, weight and skin color. Some soft biometric traits such as height, weight and age, change over time. However, traits such as gender and ethnicity are permanent and stable. Predicting these soft biometric traits can be done reasonably well by human observers. However, when having to deal with large datasets this process needs to be performed fast, automatically and efficiently.

Convolutional Neural Networks or CNNs are examples of discriminative models meaning that they are designed to predict a target label given an observation (i.e. an image) as their input. CNNs will be used to address the first objective of this project, the one of predicting gender and ethnicity from static face images.

The second objective concerns the synthesis of new face images with the required labels (i.e. gender and ethnicity). This problem cannot be solved with discriminative models, but instead, it requires the usage of generative ones. The goal of conditional generative models is the synthesis of face images with the required gender and ethnicity conditions rather than generating arbitrary faces.

Phase 1
Learn about machine learning algorithms and convolutional neural networks.
Deadline: 31st Sept

Phase 2
Build a classification model for images according to gender and ethnicity labels.
Deadline: 30th Oct

Phase 3
Build a flask app for the above model.
Deadline:20th Nov

Phase 4
Learn about Deep Generative Models.
Deadline: 15th Dec

Phase 5
Build an image generator (given particular gender and ethnicity) over the trained model in Phase 2.
Deadline: 10th Jan

Phase 6
Incorporate this generator into the flask app.
Deadline: 31st Jan

Prerequisites
No Prerequisites but it will be an added advantage if you are familiar with ML algorithms or had taken an ML SMP.

Resources/Materials
Basics of Machine Learning by Andrew Ng
Neural Nets Lectures by Andrej Karpathy
Tensorflow tutorials

Intake
6

Mentors

Sharanya Kamath, Sanjana Krishnam, Govind Jeevan

References
https://ieeexplore.ieee.org/stamp/stamp.jsp?tp=&arnumber=7550082&tag=1

https://arxiv.org/pdf/1712.00193.pdf

https://www.researchgate.net/publication/318138434_Prediction_of_Human_Ethnicity_from_Facial_Images_Using_Neural_Networks

https://pastel.archives-ouvertes.fr/tel-01725853/document

https://pdfs.semanticscholar.org/acf8/c98241329a8c83f8d870702e56b048675a36.pdf