Gender Classification of Image Data

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1. Abstract

We present an analysis of experimentation across different age, gender, and racially imbalanced groups of image data. We first generate a model on the data as a whole, which is inherently imbalanced to see how well it performs on a balanced data set. Additionally, we train logistic regression and neural network models on imbalanced data (leaving out one age and race subgroup, skewed gender distribution) and evaluate the performance on a balanced data set.

1. Introduction
2. Background
3. Data

The dataset we worked with consists of 200MB of face images. Each row of the data is a face with pre-labelled gender, ethnicity, and age. The last column of the dataset is already-vectorized pixel data of each image. This means we avoid the processes of pooling, compression, and vectorization of images.

One limitation starting out is that this data only accounts for four ethnicity labels: White, Black, Asian, Indian, and Others. Therefore, we are not able to distinguish ethnicities such as Hispanic, Middle Eastern, Pacific Islander, etc. with just this data. Additionally, we chose to combine Asian and Indian images into the same “Asian” group.

* 1. EDA

Below are plots displaying the distribution of the different classes for each of the age, race, and gender features of the data.

Chart, bar chart

Description automatically generated

Chart, bar chart

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Chart, bar chart

Description automatically generated

Methods

Experimentation

For age and race subgroups, a leave-one-out method:

**Train**

**Validate**

**Leave out one**

**Leave out one**

**Test**

**All**

For gender, create skew:

**Train**

**80% Male**

**20% Female**

**Test**

**50/50**

**Validate**

**80% Male**

**20% Female**

**Train**

**80% Female**

**20% Male**

**Test**

**50/50**

**Validate**

**80% Female**

**20% Male**

We created synthetically imbalanced training data to evaluate the performance on several different subpopulations.

Results

Conclusions

Roles

References