

Celebrity Recognition

Domain Background:

With Netflix, Hulu and other streaming services coming online, many a times viewers would like to identify an actor in the show and get relevant information. This kind of identification is also useful for live sporting events like Olympics or National games. The ability to recognize people through a mobile app or just as an add on to your Netflix service could be a game changing tool for tv streaming services, News, Movies and Sports channels.

Research papers that have helped me in choosing this project:

<http://www.face-rec.org/interesting-papers/General/zhao00face.pdf>

<https://www.robots.ox.ac.uk/~vgg/publications/2015/Parkhi15/parkhi15.pdf>

I would like my field of research to be computer vision with the ability for people to recognize celebrities on tv shows or movies as they watch.

Problem Statement:

The problem at hand is a classification problem which deals with identifying distinguishing features between celebrity faces. Images of celebrities are cropped to only contain the faces which would feed as an input to the model and the model would identify who he/she is. The interesting part about the model I would be experimenting with is the age of the celebrity and identifying them when they are young versus old.

Other than this, I would be running this model over a video clip which would have its own problem of identifying multiple celebrities in same clip.

Datasets and inputs:

Datasets to be used are:

Public Figures: <http://www.cs.columbia.edu/CAVE/databases/pubfig/download/>

FaceScrub Dataset: <http://vintage.winkler.site/faceScrub.zip>

Public Figures dataset would be the primary dataset used for this model. A subset of facescrub dataset would be used to identify celebrities from a movie clip to showcase the results at the end. There might be additional images that could be added to meet this requirement. If public figures dataset is large, a subset of this would be considered for the model at the time of development.

Public figures database contains URL's for 16,336 images of 60 celebrities. But a majority of the links are dead and would reduce the total number of images we have. Some of them have 2 or more faces in them. I would be cropping these images to only contain the specific celebrity for that folder and resize them to 200 by 200 pixel. There seem to be 60 people in that dataset. A lot of these images have side faces, shadow and exposed lighting which could help in learning.

Either I'll download the dataset and preprocess everything through code or I'll prepare a dataset manually from the urls and filter out images that are good and upload it to a website and download it from there for the notebook.

I'll combine the face images from the two datasets after initial model development and split the data into train and test set with a balance of over exposed and dark images.

Solution Statement:

For preprocessing the data to detect faces and crop them from the large images, I'll use Haar cascades which would make preprocessing the data easier. For identifying facial features, the technique I have currently researched involves the use of HOG transform which will consider the face structure, shape of eyes, nose and other features. I'll also use gradient techniques as well as color scaling techniques to shuffle the data and help the model to learn better.

One of the tensorflow techniques which could act as a baseline is Alexnet which is a powerful algorithm. A modified version of this algorithm could identify features with greater accuracy. In addition to these baseline techniques, I'll add more techniques as and when I research about them or face an issue.

Benchmark Model:

A benchmark model would be an initial run with the Alexnet algorithm to identify celebrities in my dataset. Upon modifying the algorithm, I would expect the model to perform better than alexnet.

The results of one of the best algorithm for the Public figures dataset is listed on the website

Algorithm	Average Accuracy
<i>Attribute Classifiers (Kumar et al. 2009)</i>	78.65%

Evaluation Metrics:

An F1 score seems to be a good metric for evaluation.

Project Design:

Preprocessing:

I'll crop the images to contain only faces which would help the model to focus only on facial features.

Processing images:

Adding color masks, shadows, flipped images as well as skewed images would increase the number of images per celebrity. A crucial step is to align the images to avoid left or right tilted faces causing an accuracy error in the model.

Create baseline model:

An SVM or simple Alexnet would be an initial start to the model which could also be a baseline for evaluation of the test dataset.

Final Model and training:

This would be mainly modifying the Alexnet to improve the accuracy obtained by the model. At this point, my research shows alexnet is a good starting point and am still not sure How I would be able to

modify it. As I start with the project, I would be having a better intuition of how to modify the algorithm to take advantage of facial structures or shapes from images.

Testing:

A test dataset with over exposed images as well as masks on the image would tell us how good the model is.

Video:

Identifying actors from a movie clip would be an icing to the cake.