Attribute and Simile Classifiers for Face Verification

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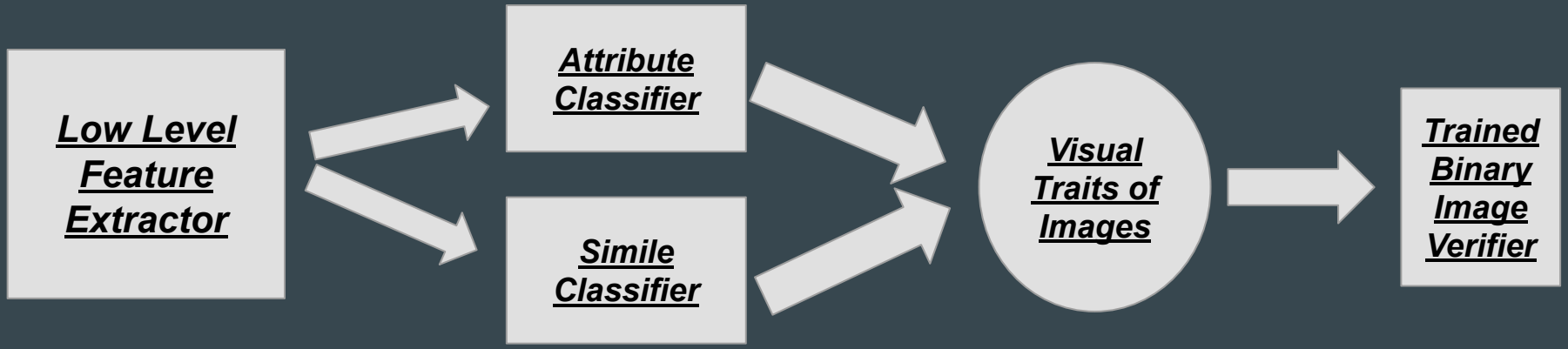
PIPELINE INTENDED



Classifiers Aimed By the Paper

Attribute Classifier

1. 60-65 Binary classifiers. Cover Describable aspects of visual appearance Supervised Learning
2. Eg. Gender, Age group, skin color, etc.

Simile Classifier

1. Important aspects which cannot be described easily but are key in visual appearance.
2. Unsupervised Learning
3. Describe a person's appearance in terms of the similarity of different parts of their face to a limited set of "reference" people.

Verification Classifier

1. Given the trait vectors of two images, it decides whether they are of the same person.
2. Final Classifier of the pipeline.

PROGRESS TILL NOW

Literature Review	• Completed understanding the paper • Following the pipeline as per paper, aim to replicate the results.
Processing Dataset	• Understood the structure and split the Dataset into train and test sets for classifier preparation. • Distribution of images was not random , it was as per the research paper.
Attribute classifiers	• Trained basic classifiers without any processing on the images. Used the dataset structure as mentioned above. • Results were below par, 60 %. Although this gave us a baseline.
Low Level Feature extraction	• Paper vaguely mentions use of low level features for image representation. • Followed our own interpretation to use feature extraction to improve the baseline accuracy of 60 %

LOW LEVEL FEATURE EXTRACTION

- Aim is to provide good meaningful and compact representations of images for training purposes.
- Extract faces from given images using inbuilt CV2 functions.
- Align all extracted faces to facilitate landmark extraction and also to bring all of them in a common frame of reference for observation.
- Extract important regions from these aligned faces, this helps pinpoint the important regions of the faces which can be used in the representation.
- This ‘information’ is interpreted and stored in the form of various local/low-level/pixel-level properties of images like :
    - Histograms of RGB,HSV versions of the image.
    - Local Edge gradients.

IMPLEMENTATION DETAILS

- HAAR Face detection function available in opencv is used to detect faces.
- It is a machine learning based approach where a cascade function is trained from a lot of positive and negative images. It is then used to detect objects in other images.
- To achieve face alignment we constructed affine matrix to transform the image, source and destination points are derived by holding eyes as reference.
- For landmark detection we used inbuilt libraray DLIB, which is a popular face/shape landmark predictor.

ATTRIBUTE CLASSIFIER

- This is the first type of classifier. For a given attribute, this classifier learns a binary boundary denoting presence or absence of the attribute.
- The paper mentions 63 predefined attributes like ‘baby’ , ‘Bushy eyebrows’, ‘moustache’ ‘frowning’ . They also have provided annotated values corresponding to each attribute for each image.
- Also, the paper has mentioned particular pairs and image sets to be used for training so as to facilitate best possible training .
- Till now we have trained few classifiers without using any feature extraction or good representation of images. As mentioned before , we did not achieve good results , but we got an idea for the baseline results which we aim to beat at the very least.

GOING FORWARD

- The very next step after this is to train attribute classifiers with representations derived from low level features.
- Training Simile Classifiers will be the next step. As the paper has mentioned , we must use ‘reference images’ and there special features to compare other images. The paper again has not explicitly mentioned the details for this, we will use our interpretation to bridge this gap.
- The final classifier which is the aim of the paper, is the one which verifies whether the two images are of the same person. It uses both attribute and simile classifiers to train. This will be the final step of the pipeline
- We may try to incorporate our ideas in places where paper is not explicit in its details.