What is my Name?

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***Abstract*—This report introduces a new concept of predicting the first name from the facial image. The prediction problem here is treated as a classification problem. The dataset mentioned here has no additional labelling cost apart from the name tags freely available on the internet. Dataset consists of 100 popular names of the U.S. Several studies show a relationship between first names and facial features. Despite such a system's low accuracy and imperfectness, the prediction was correct at rates that were greater than chance. The future work of this prediction problem is based on Attention.**

***Index Terms*—First name, facial image.**

I. Introduction

Suppose a person meets a new face. They have several questions in their mind. Who are they? (i.e., First Name). How old are they? (i.e., Age). Where are they based? (i.e., Ethnicity in a more general way). What is their gender? What is their occupation? Even one can think of the emotions of the other person. Also, consider a similar scenario for the image of a new face. So consider the above mentioned as features we can extract from a facial image.

The human brain can predict some of these attributes through a glance. It can predict gender in almost all cases. It can also predict the age group. Predicting exact age can be a bit difficult, though. Through some other facial features, it can also predict certain races. Not from the face, but at times may be through the clothing, some occupations can also be predicted. It can also predict happiness or sadness or some other emotions on a face. So, from the above-mentioned features predicting the first name can be new. Also, nearly impossible.

Every individual has a faceprint. It's an electronically stored portrayal of a person's face that's as unique as a fingerprint. So it may have applications for security purposes [1].

The human face has facial landmarks. For instance, eyes, nose, ears, lips etc., can be described through these landmarks. These landmarks are used in face recognition. These face recognition systems can be used for face unlock features. A few years back, a case where the face unlock of a mobile device failed to differentiate two twins was found. So a potential solution of differentiating twins with the landmarks of the tip of the ears was found. These landmarks can also be used for expression or emotion detection.

Parents expecting a baby, mostly spends a great amount of time deciding on the name of the child. Most of the times it maybe assumed that the choice of the name is nearly random from a vast pool of names [2]. Does there exist any relationship between the first name of the person and the facial image? Mostly if people are posed with the question, they would deny. But there are several studies that indicate the existence of a relationship.

Shakespeare states, "What's in a name?" and might proclaim it to be either insignificant or random. Nonetheless, a growing amount of study examines the relationship of our names and who we are (Krammer et al., 2015, p. 2) [3].

The focus is on first names and not on the last names because the former one illustrates more freedom and variety when selecting. At the same time, the latter tends to be determined more by lineage or, in some cases, based on occupation. Rather than arbitrariness, clear patterns have been observed between the owner and the name. In general names are mostly gender specific. Even though very few names are gender-neutral like Jamie. Even the education of the parents' and their race does influence the choices of names. Names do carry the information about the age because trends in naming keep on varying throughout decades. (Krammer et al., 2015, p. 2) [3].

One of the potential applications of name prediction is name association. Suppose, for instance, we are given a group photograph, and we know the name of the people present there. So using this system, one can associate the name to the face. Like in various social media platforms like Facebook and Instagram, people post images and tag other users. So, the system can associate the name to the face. This thing is already present in these social media, but still, there may be some scope of improvement in that.

The remainder of the report includes the following. The second section here includes the problem Statement. The third section describes Literature Survey. The fourth section provides information regarding the dataset we plan to use. The fifth section proposes future work. The sixth section concludes the report. And then, the report ends with references.

II. Problem Statement

Predict the first name of a person from the facial image of the person. The problem here is assumed to be a classification problem. In here, first 100 popular names of U.S. are taken.

And the output will also be from the same set of these 100 names.

The Classification problem means identifying a category from the available classes. The system predicts the class label which accommodates the new training sample. This task is supervised learning as the class labels are predefined.

III. Literature Survey

According to [4] (as cited in [2]) the achievements of face detection and recognition in computer vision have been found dating back to approximately four decades.

This work poses as well as thus starts to solve a unique topic in facial processing. Is it possible to infer a person's name from through a single facial image? While that too, without additional sample images of such face. Expecting a high level of accuracy from this work is impractical. However, the identical twins get their unique names. This flawed system could have a variety of usages, for instance, in terms of security and biometrics. In the security aspect, finding fake IDs from databases can be solved using this system. And for biometrics, we can infer the ethnicity, sex, age by taking a guess of probable names from a face [2].

A variety of aspects influences the name selection. The gender of the individual can control the name selection. Even the age, race, social culture, economic culture, the popularity of names, names of near and dear also influence name selection. Thus, even within an ethnicity, the occurrence of particular first names varies. There is a significant age difference in easily distinguishable name pairs. The name pairs which exhibit the same popularity trends seem indistinguishable. [2].

The visual characteristics that distinguish any given set of people differ. First names and numerous face aspects contain a relationship. According to [5] (as cited in [2]), aspects such as skin colour, male-ness, facial feature size, age, and potentially other unnamed traits correlate with first names. Now, for instance, the genders of "David" and "Mary" vary. At the same time, the names "David" and "Ethan" are distinguished primarily in age because "Ethan" is a newer name. [2].

Danny has a boyish appearance and a permanent smile in someone's imagination. Zoe has big eyes, wild hair, as well as a mildly amused demeanour. According to studies, the concept that persons with the same name have the same typical "look" can be genuine. A study was released in the Journal of Personality and Social Psychology. Here the researchers offered an unfamiliar face that had five choices of names. And the individuals selected the correct name for around thirty-five per cent of the cases. In contrast, the probability is only twenty per cent [6].

They showed a face with ten alternative names because it seemed highly unreasonable to expect a person to choose one name from a list of the 100 names. The names in this list here include nine arbitrary names of the same sex in a randomized fashion and one correct name. The correctness of human predictions is thirteen point seven per cent, which is much better than the chance of ten per cent [2]. The researchers never claimed that this can be carried out by anyone anywhere without having any cultural familiarity.

Individuals having the same name are prone to having almost identical expressions around the mouth and the eye area of the face. These areas seem easily adjustable, as per a computer analysis. [6].

The classifier was trained with the facial image obtained over the internet. The output values are significantly higher than the probability. Thus, the system accurately predicts the actual first name of research subjects. There was no extra user intervention in training. First names are not distributed arbitrarily among society's members [2].

Figure 1 is the summary of the system. According to [7] (as cited in [2]) the test faces are first scaled with observed eye locations and then resampled to 150 x 120 pixels. By sampling on a dense grid with twp-pixel intervals, they extract SIFT descriptors [8] (as cited in [2]). Each 128-dimensional SIFT descriptor is then encoded to a 1024-dimensional code using the Locality-constrained Linear Coding (LLC) method which is according to [9] (as cited in [2]). These encoded LLC codes are combined by applying max-pooling above a spatial pyramid [10] (as cited in [2]), resulting in a 1024-dimension vector at each of the 21 pyramid grid points. For each face, this results in a feature vector with 21 x 1024 = 21504 dimensions [2].

Thus, the 21 feature vectors could be thought of as originating from 21 complementing feature channels and the authors suggest the Multi-Feature SVM (MFSVM). The algorithm is based on the AdaBoost framework, where the classifiers being SVMs that work on multiple feature channels. For instance, they have T feature channels and N training images. The algorithm is as below [2] :

Data: Training data $x_{t,i}$, training labels $y_i \in \{-1, +1\}$, testing data z_t, where $t = 1, \ldots, T$ and $i = 1, \ldots, N$
Result: SVM classifiers $f_t(z_t)$, classifier weights α_t
Initialization: weights $D_i = 1$
for $t = 1 : T$ **do**
(i) Do SVM cross validation with weights D for obtaining confidence $f_t^{cv}(x_{t,i}) \in R$ and prediction $\hat{y}_{t,i}^{cv} = \text{sign}\left(f_t^{cv}(x_{t,i})\right)$, calculate error
$err_t = \frac{\sum_{t=1}^{N} |\{\hat{y}|\hat{y}_{t,i} \neq y_i\}|}{N}$
$err_t = \frac{\sum_{t=1}^{N} \mathbb{I}\left\{\hat{y}_{t,i}^{cv} \neq y_i\right\}}{N}$
(ii) Train SVM f_t with D;
(iii) Calculate $\alpha_t = \frac{1}{2}\log\left(\frac{1-err_t}{err_t}\right)$;
(iv) Set $D_i = D_i \exp\left(-\alpha_t y_i f_t^{cv}(x_{t,i})\right)$, and renormalize so that $\sum_{t=1}^{N} D_i = N$;
end
Output the final classifier $f_{\text{all}}(z) = \sum_{t=1}^{N} \alpha_t f_t(z_t)$

Algorithm: Multi-Feature SVM [2].

IV. Dataset

Name100 is the first dataset with Name and Face data. They create an extensive dataset by choosing images and tags from

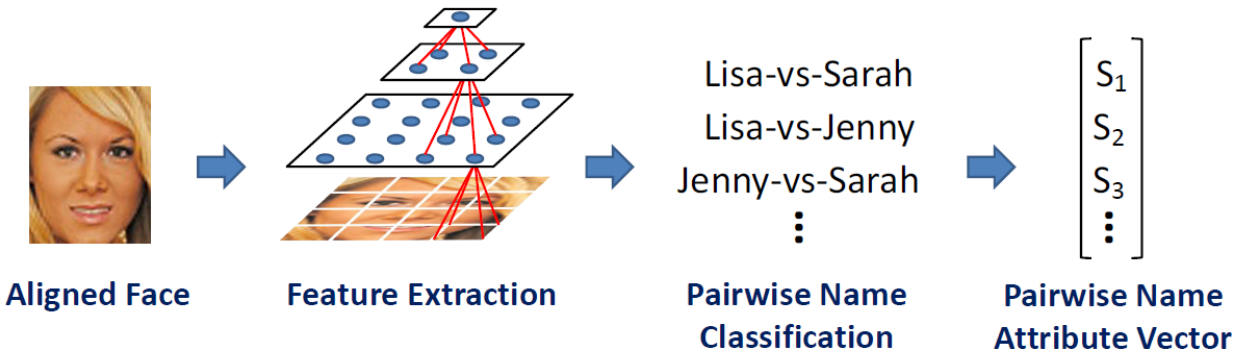

Fig. 1. A summary of the system. The confidence scores produced by the pairwise name classifiers are referred to as the pairwise name attribute vector. [2]

Flickr to determine the connection between first name and facial appearance. The dataset comprises 800 faces, for each of the 100 most famous first names, based on information from the U.S. Social Security Administration (SSA) [11] (as cited in [2]). After completion, the dataset contains 48 men's names, 48 women's names, and 4 gender-neutral names. The names listed represent 20.35 per cent of all the Americans birthed from 1940 to 2010 [2].

Fig. 2. Sample of Alejandra's facial images from Name100 dataset [2]

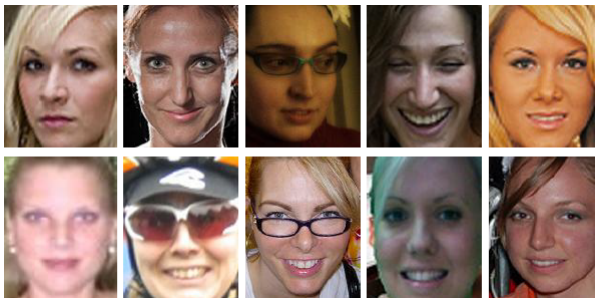

Fig. 3. Sample of Heather's facial images from Name100 dataset [2]

When there are numerous people in a photo, name ambiguity occurs. Thus, images that contained multiple faces were eliminated, and it was verified whether the image tag included exactly one first name tag. Secondly, they removed the images that had celebrity names. The reason being this can result in a bias in their sampling. Assume that a search for "Brad" could produce a lot of photographs of the film actor "Brad Pitt," distorting the facial feature pattern for the name "Brad" [2].

Fig. 4. Sample of Ethan's facial images from Name100 dataset [2]

Here figure 2 shows Alejandra's face examples. Similarly, figure 3 and figure 4 shows Heather's and Ethan's face examples respectively. Alejandra's hair and skin are usually darker unlike Heather's. The name Ethan, which gained popularity in recent years, appears to be much young. Along these lines going a step further, for instance, the predominance of specific first names varies amongst a race.

V. Future Works

The objective of the work is to predict the first name of a person using the given facial test image. To do this, I plan on using Attention.

In layman terms, Attention is focusing on the essential areas and fading out the rest, and devoting more computational power to the more minor but essential part.

VI. Conclusion

In the discipline of computer vision, name prediction can be a tough and inspiring problem to solve. This work did not receive that much consideration and had very restricted efforts in terms of research. The name prediction system is not that ideal to function well in all real-world situations. The report presents a summary that includes a few existing studies and methodologies carried throughout this domain. The current works have high prediction accuracy than random chance. Plenty of work needs to be carried out to achieve higher efficiency and accuracy goals.

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