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# SAS® GLOBAL FORUM 2020

MARCH 29 – APRIL 1
WASHINGTON, DC

USERS PROGRAM

# Face Recognition using SAS® Viya®: Guess who the person is!

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Pratyush Dash, Anvesh Reddy Minukuri

Oklahoma State University, Comcast Corporation

Abstract
Introduction
Methods
Modeling
Results
Conclusion

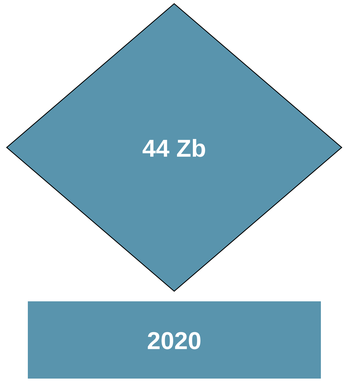
Humans can take a look at an image and instantly recognize what the object is in the image, identify the person in the image or the location of the photo. Performing these tasks for a computer would be very tough. Using fast, accurate and reliable algorithms could make computers to drive cars with sensors, enable them to recognize humans, operate different machines and even perform surgeries.

The digital universe is expected to reach 44 zetabytes by 2020 because of the growth of Internet of Things (IoT). This shows us about the massive opportunity we have in terms of digital content analytics. Facial recognition and classification algorithms like deep learning and neural networks can extract information from photos or videos and classify them almost instantaneously after it is posted online. There are many other applications of such algorithms like in security screening, medical image processing, and insurance claims.

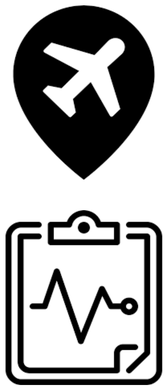
This work proposes to analyze celebrity images and classify them as different people using the deep learning techniques and measuring accuracy. Through this project the objective of automatically detecting who the celebrity is achieved and it can be further used to segregate them into different folders.

Pratyush Dash

**Growth of IoT**




**Applications**



**Concepts used**

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## What is Face Recognition?

- It is a biometric system to identify or verify a person from digital images
- Each Image consists of multiple pixels and each pixel is a number
- For the computer to understand an image, it can be represented as a matrix of numbers
- Features are information of an image that are relevant to identifying a face
- They can be combined into complex features to detect edges, corners, eyes of the face
- Using deep learning techniques in SAS Viya these features can be used to create, train and tune neural networks for the applications of face detection and face recognition

Face recognition

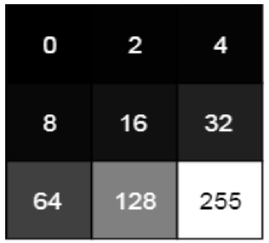
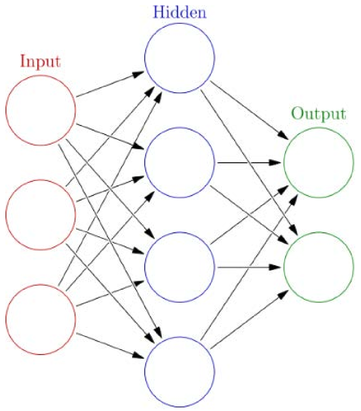



Image with Pixel values

## Neural Network

- Models that were designed to mimic neurons in the brain
- Consist of components including input layer, hidden layer(s) and an output layer
- Number of hidden layer(s) can impact the accuracy of model
- A deep neural network is one that has many hidden layers between the data input and output layers
- Can model complex non linear relationships for better classification
- In the context of facial recognition, shallower sections of a network may be able to detect lines whereas deeper layers can detect more complex features such as parts of faces



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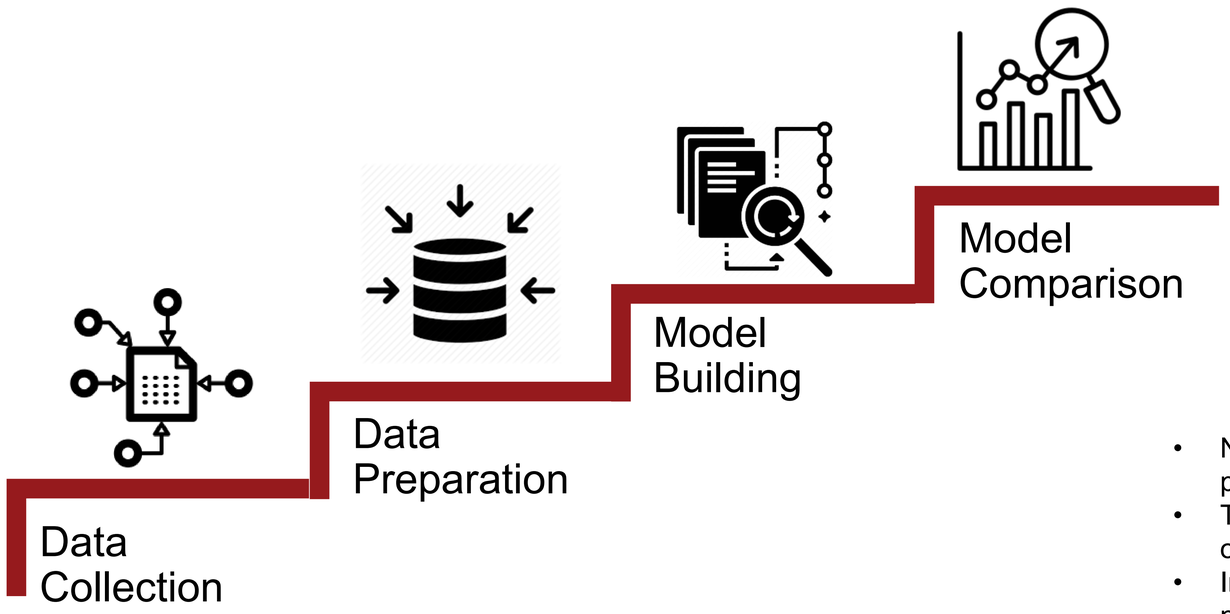
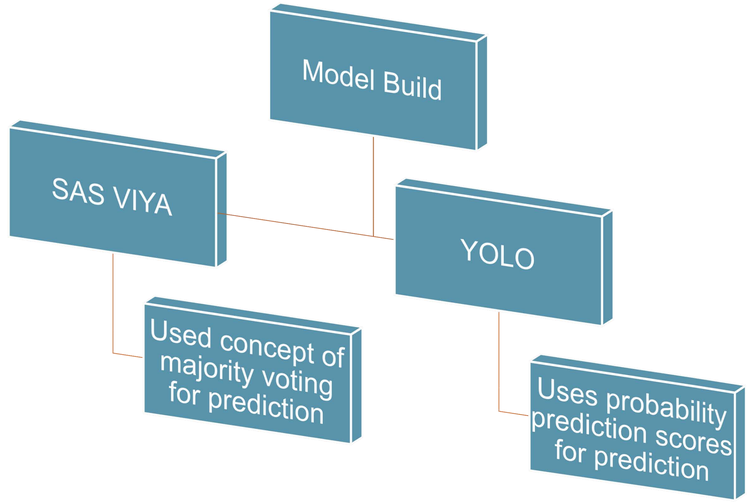
## Data Description

- Dataset consists of 400 images of 40 people. 10 for each person
- The images were taken at different times varying lighting conditions and different facial expressions
- Frontal view of faces
- Dark homogeneous background

**Source:** The Database of Faces comes from AT&T Laboratories Cambridge

## Methods




- Neural network model was individually trained on all the blocks for all the images in order to predict the person ID for both the models
- The SAS VIYA model used the concept of majority voting from all of the blocks for a given person ID in order to make final decisions to predict the person ID
- In case of YOLO we got the probability prediction scores. It uses regression to identify and assess the probability score of images.

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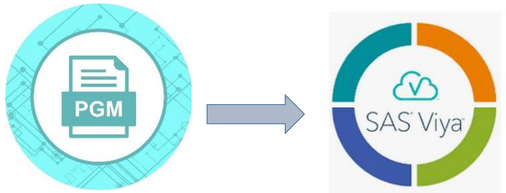
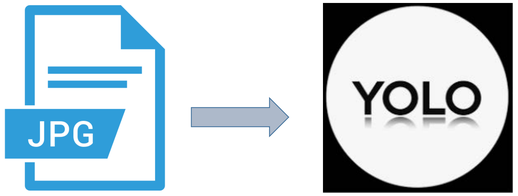
Load Images → Resize Images → Data Partition

## Data Preparation

- Images were read in pgm format for SAS VIYA and jpg format for YOLO
- The purpose of image resizing is to produce a lower data size, which hastens the processing time




## Data Preparation Steps

Images before processing → Data Preparation steps

100*100 Pixels

Face vector: 1*6400

- Training Set consists of 360 images of 40 people
- Each image resized to 100*100 pixels
- Image divided to 25 blocks. Each block 16*16 pixels in size
- Each block converted to 1*256 vector
- All blocks then combined into a 1*6400 vector

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## Misclassification rate comparison

| Description | SAS VIYA | YOLO |
|---|---|---|
| Number of observations read | 360 | 360 |
| Number of observations used | 360 | 360 |
| Misclassification rate(%) | 10% | 87% |

Misclassification Rate – 10%

Works well when images have similar backgrounds and features

High speed processing

Needs more training images

## Model Comparison

- SAS VIYA model was able to correctly identify for about 90% data.
- The high accuracy is because of the data, where all the images had similar backgrounds, the same resolution and a single person
- YOLO Model is incorrectly assigning a high probability score to the test image and is not performing that well
- If more number of training images had been used to train the YOLO model for a specific person it could have led to better results

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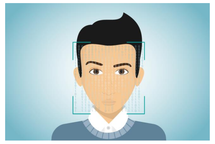
## Conclusion & Future Scope

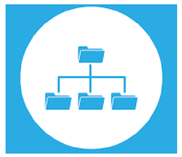


Misclassification Rate :10%


Build API



Identify people



Store images in separate folders

- SAS Viya turned out to be our champion model
- YOLO was believed to be a better and faster model, but due to less number of training images it didn't do well
- Using these results, we can build facial recognition models on SAS Viya which can have practical use in many industries
- As future work an API program which would help segregate different people and their images into different folders

## References

Huetter, J. (2016, October 11). "Tractable photo-analyzing AI to assess vehicle damage for Mitchell." Accessed February 24, 2018. Retrieved from http://www.repairerdrivennews.com/2016/10/11/tractableceo-says-ai-will-assess-vehicle-damage-for-mitchell-company-specializes-in-ai-photo-analysis/

Perret, E. (2017, January 29). "Here's How Many Digital Photos Will Be Taken in 2017." Accessed February 24, 2018. Retrieved from https://mylio.com/true-stories/tech-today/how-many-digital-photos-willbe-taken-2017-repost

Leign Ann Herhold and Ivan Gomez, Zencos Consulting LLC, "Image processing: Seeing the world through the eyes of SAS Viya" Retrieved from https://www.sas.com/content/dam/SAS/support/en/sas-global-forum-proceedings/2018/2759-2018.pdf

Swastik Somani. "Face recognition using Tensorflow Pre-Trained model & OpenCV" Retrieved from https://medium.com/@somaniswastik/face-recognition-using-tensorflow-pre-trained-model-opencv-91184efa4aaf

Adrian Rosebrok. "Face recognition with OpenCV, Python and deep learning" Retrieved from https://www.pyimagesearch.com/2018/06/18/face-recognition-with-opencv-python-and-deep-learning/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