Face Recognition Smart Attendance System using LBPH Algorithm

Project Aim
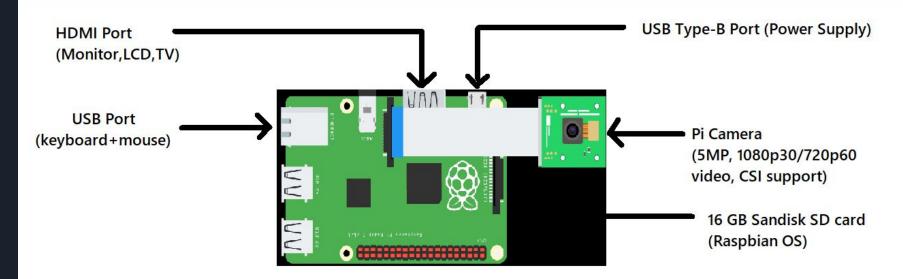
- **To build automated Attendance system to prevent time-wastage in classrooms**
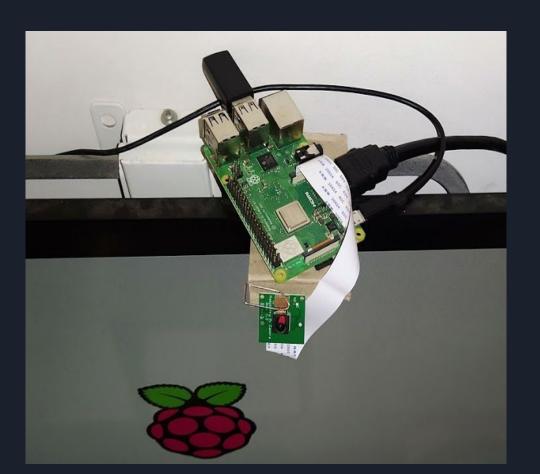- **Ease out the process of Manual Attendance**

- **On-Cloud Analytics and Report Generation**

Diagrammatic Representation

HDMI Port
(Monitor,LCD,TV)

USB Type-B Port (Power Supply)

USB Port
(keyboard+mouse)

Pi Camera
(5MP, 1080p30/720p60
video, CSI support)

16 GB Sandisk SD card
(Raspbian OS)

Raspberry pi Model 3B+

Project Set-up

Project Cost

- **Raspberry pi 3B+** ------------------------₹ 3000/-
- **16 GB Sandisk SD Card**----------------₹ 250/-
- **HDMI Cable**------------------------------₹ 120/-
- **USB Type-B micro Cable**--------------₹ 40/-
- **USB Adapter (keyboard+mouse)**-----₹ 1950/-
- **Monitor Display**------------------------₹ 1500/-

Net Total: ₹ 6860 /-

Raspberry pi will be used as an IoT device to get local data by constructing a face recognition architecture.

Part 1 - IoT device setup

Part 2 - Face recognition setup

Part 3 - AWS Analytics

Setting up OS for Raspberry pi

→ Downloading Raspbian Image

→ Flashing the OS image to the SD card on Raspberry pi

→ Etcher for Windows

→ Wait about 5~10 minutes

→ OS installation Completed

Raspbian

Hardware/Software for Raspberry pi

- **Raspberry Pi Wifi Setup**

- **Raspberry Pi Packages Installation**

- **Setup AWS Credential On Your Raspberry Pi**

- **Setting up Quicksight Dashboard**

- **Setting AWS Credential On Computer/Laptop**

- **Install Certificate Into Your Pi**

  With credentials like :

  1. **Public user key**
  2. **Private user key**

Software used

- **Python 3.7**

  1. **OpenCV** *(Image Detection & Recognition)*
  2. **Tkinter** *(Attendance UI)*
  3. **Numpy, Pandas** *(Image/data processing)*
  4. **Datetime, csv** *(records time-in/out with name in CSV)*

- **AWS Cloud Service**

  1. **Security certificate set-up**
  2. **Purchasing appropriate service**
  3. **Signing-up Dashboard**

Face Recognition Algorithm

LBPH Algorithm *(Local Binary Patterns Histogram algorithm)*
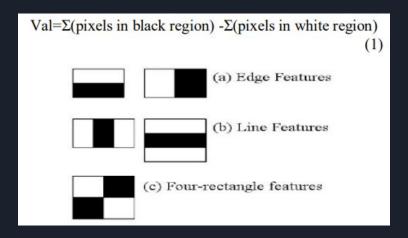
Algorithm uses 160,000 features

4 primary steps of implementation of Face Recognition Algorithm

1. **Selection of Haar features**
2. **Integral images**
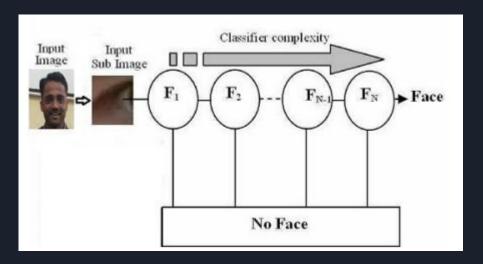3. **Adaboost**
4. **Cascade Classifier**

Haar features

- similar to these convolution kernels

- calculated by subtracting the sum of pixels under white rectangle from the sum of pixels under black rectangle.
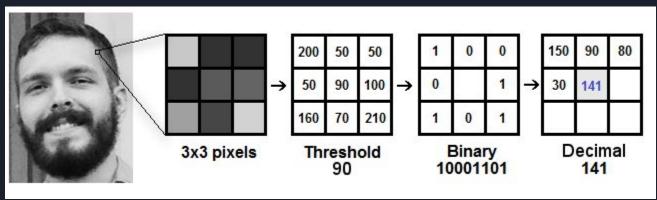
$$Val=\Sigma(\text{pixels in black region}) -\Sigma(\text{pixels in white region}) \tag{1}$$

(a) Edge Features

(b) Line Features

(c) Four-rectangle features

Cascade Classifier

- Comprises of composition of all stages containing strong classifier where all the features are combined in different stages

- Determines whether an image is face or not

Working & Accuracy of LBPH

IEEE ref. for efficient accuracy of

LBPH Algorithm

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Abstract

Document Sections

I. Introductions

II. Methodology

III. Implementation

IV. Results and Discussion

V. Conclusions

Authors

Figures

Abstract:
Face recognition is the biometric personal identification that gaining a lot of attention recently. This method has the ability to identify a person from still image and video by using human face. For the accurate recognition, algorithm and reference database needs to be concerned. However, in the practical system have many external factors that affect to the recognition accuracy differently for each algorithm. This is a challenge problem of class attendance recording system deployment, which has uncontrolled environments. This paper comparing three well known algorithm that are Eigenfaces, Fisherfaces, and LBPH by adopts our new database that contains a face of individuals with variety of pose and expression. The experiment of face recognition in video conducted by varied the external factors that are light exposure, noise, and the video resolution, in the possible range. The results showed LBPH got the highest accuracy in all experiments, but this algorithm has the higher impact of the negative light exposure and high noise level more than the others that are statistical approach.

More Like This

Real-time face recognition using Gram-Schmidt orthogonalization for LDA

Proceedings of the 17th International Conference on Pattern Recognition, 2004. ICPR 2004.

Published: 2004

Jagging artifact free interpolation [video signal processing]

2005 Digest of Technical Papers. International Conference on Consumer Electronics, 2005. ICCE.

Published: 2005

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Top Organizations with Patents on Technologies Mentioned in This Article

AWS Cloud Services

Among various available service we decided:

" AWS- Quicksight "

- **Billed at $0.30 /session**

Amazon QuickSight

First BI Service with Pay-per-Session Pricing and ML Insights for everyone.
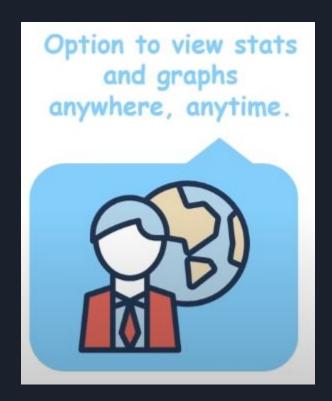
Quicksight Features

Option to choose data source of your choice

SPICE Engine *(superfast/viable)*

SPICE - Superfast, Parallel, In-memory engine

Quicksight Analytics *(smart/adaptive)*
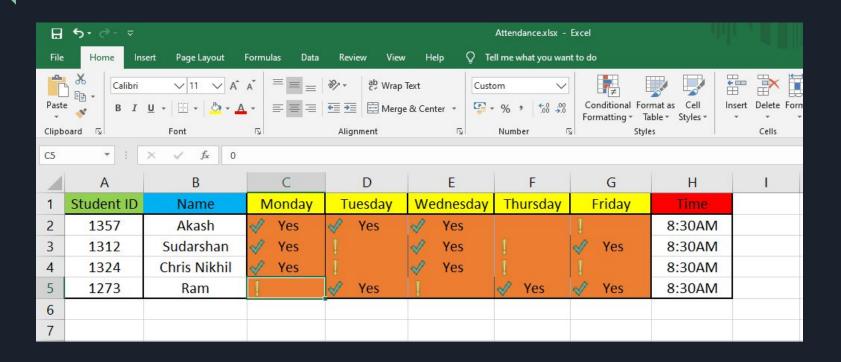
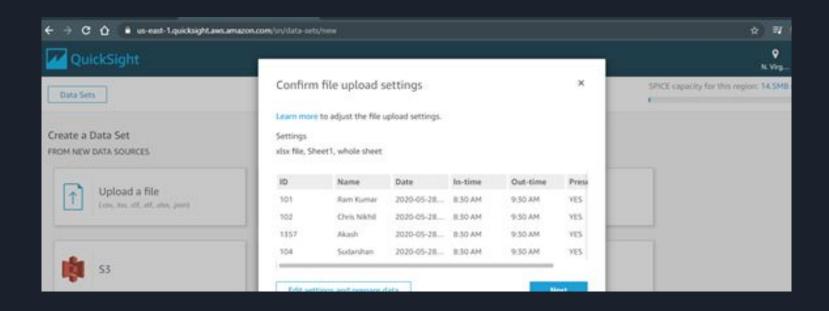# Quicksight Easy-share
(Supported across various platforms)

Uploading Data
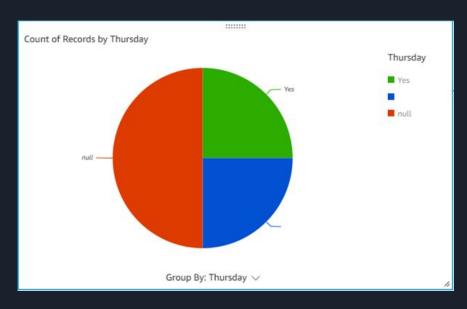*(.csv, .tsv, .json, .xlsx)*

Quicksight Dashboard Analytics(1/2)

Fig 1.1
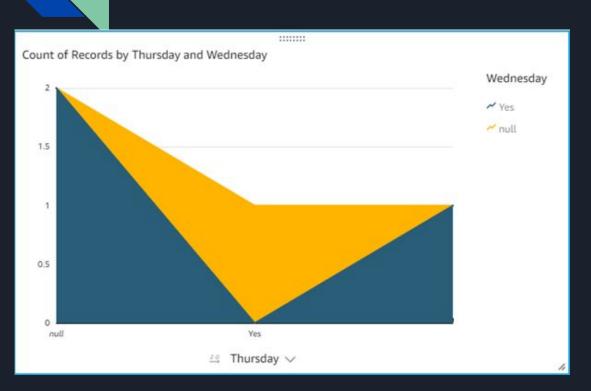

Fig 1.2

Quicksight Dashboard Analytics(2/2)
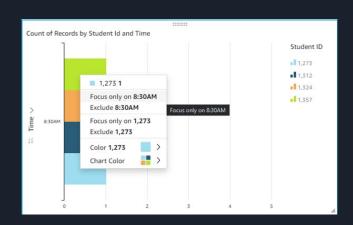

Fig 1.3

Fig 1.4

Thank You
for
providing this opportunity!