IMAGE BASED ATTENDANCE SYSTEM

Problem Statement

Most of the educational institutions are taking attendance as traditional roll call or fingerprint.

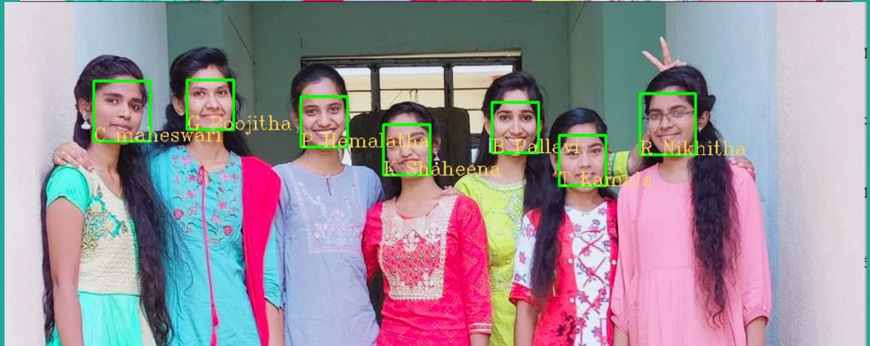
Previous Solution

Face attendance system wherein webcam captured frames will be matched against the existing trained images and stored their names in csv file along with date and time.

In our previous solution we used Haarcascade classifiers for face detection. But it only detect the frontal faces.

Solution

The faculty would simply take a photograph of the class and uploads it
to the cloud system, attendance of the students will be marked, where it contains all
students database for verification like images, name of the student.



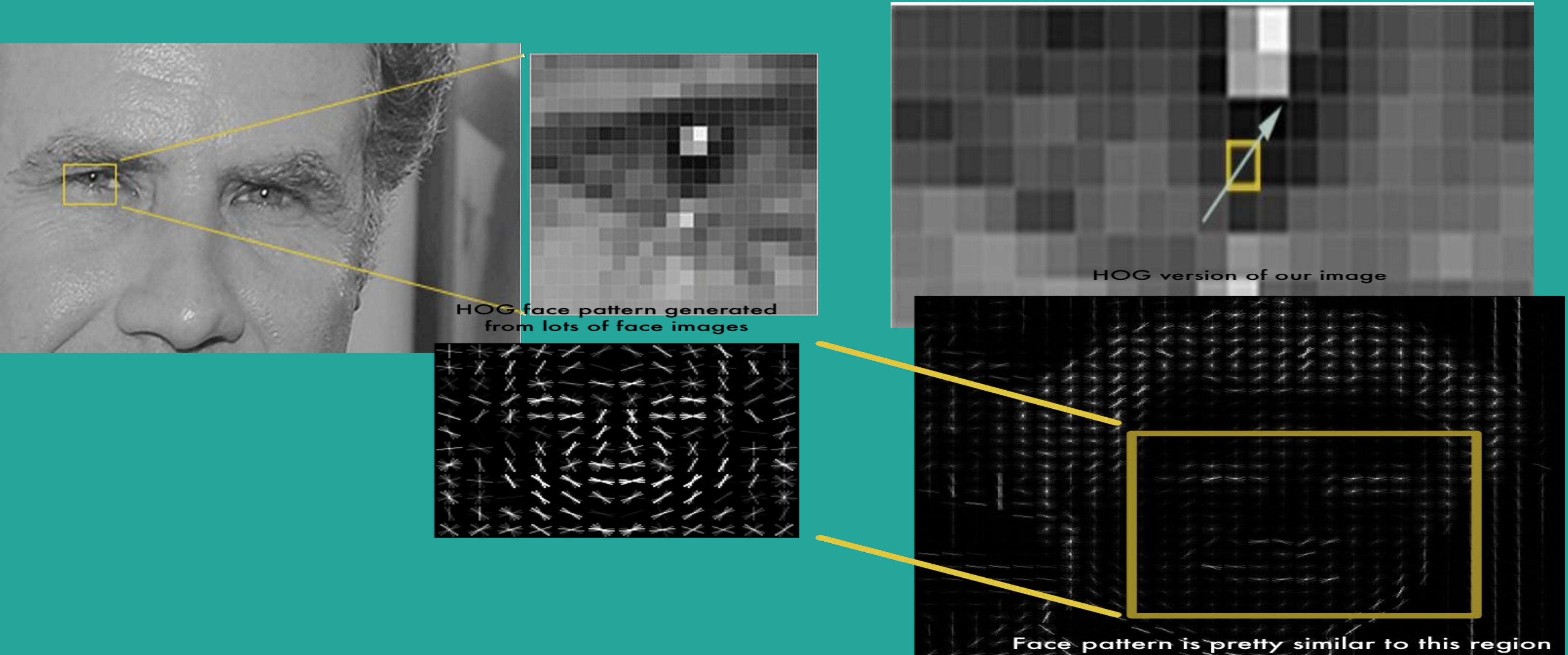
	A	B	C	D	E
1		ID Number	Name	Branch	Section
2	7	R161008	C maheswari	ECE	C
3	8	R161009	G Poojitha	CSE	D
4	20	R161021	B Pallavi	CSE	A
5	16	R161017	R Nikhitha	ECE	A
6	18	R161019	P Hemalatha	ECE	C
7	1	R161002	T Kamala	CIVIL	A
8	0	R161001	K Shaheena	ECE	C

Steps required

- Face Detection
- Feature extraction
- Face recognition
- Write Attendance to csv file

Face Detection

For face detection we used HOG features.This is done by extracting the gradient and orientation (or you can say magnitude and direction) of the edges

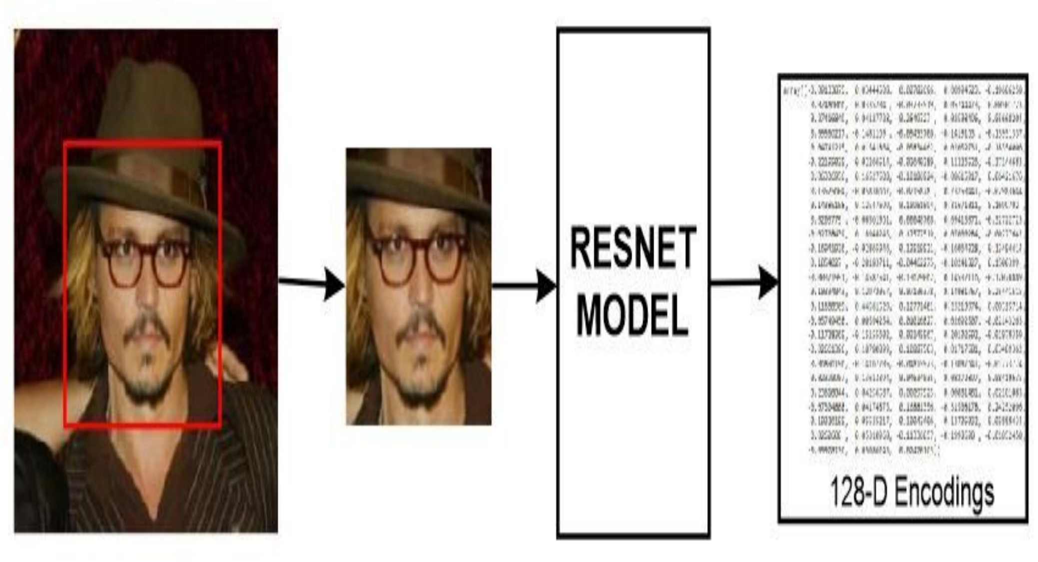


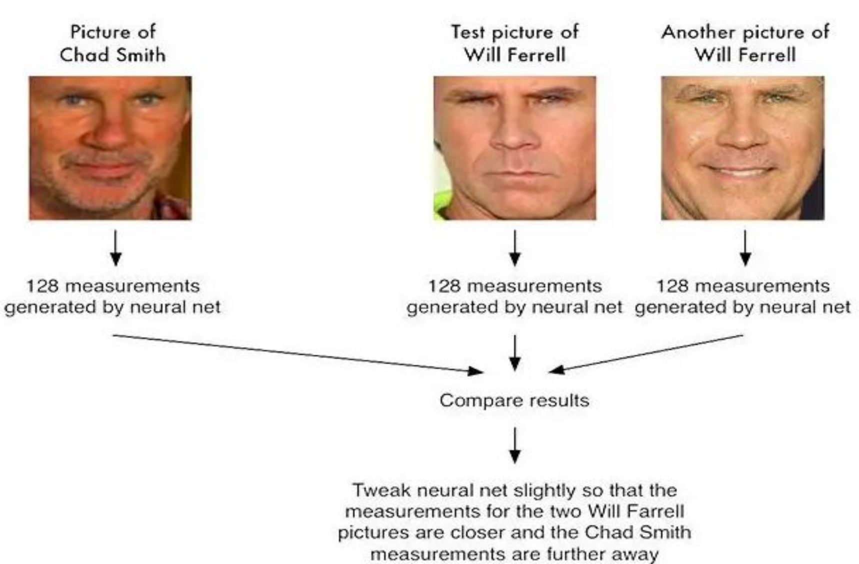
Feature Extraction

Dlib facial recognition network, the output feature vector is 128-d (i.e., a list of 128 real-valued numbers) that is used to quantify the face. Training the network is done using triplets:

Our network architecture for face recognition is based on ResNet-34.

The network itself was trained on a dataset of ≈3 million images, reaching 99.38% accuracy.





Resnet architecture

Residual Block:

$$Y = F(X)+X$$

Logic behind Residual Networks is make (Y = X)

X is input , Y is output, Y=F(x)

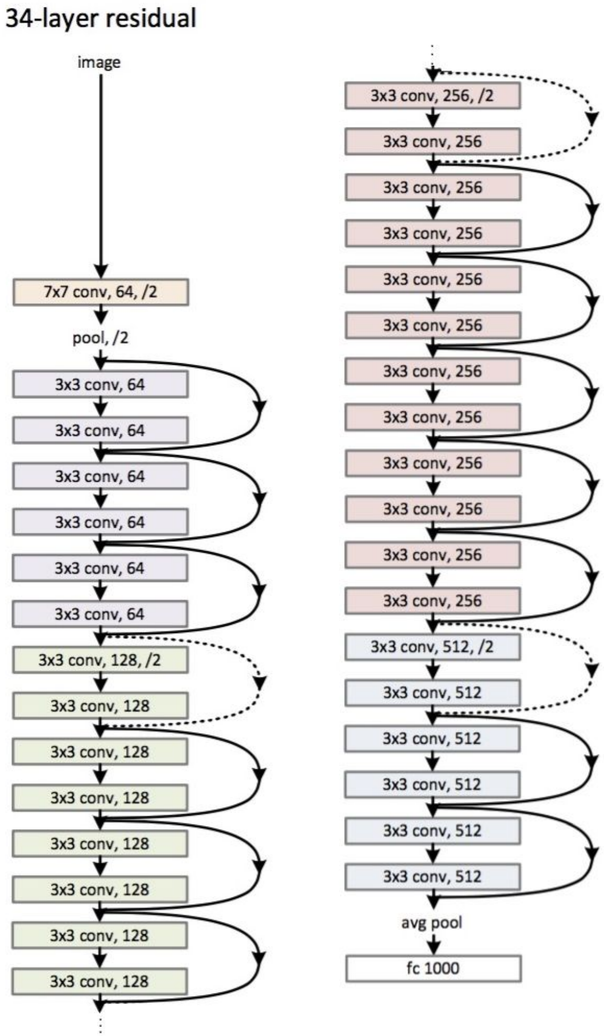
If we make F(x) = 0 then it is easy for us to make input equal to output

Y=X+F(X)

Y=X+0

Y=X

#In Normal networks we learn from Y but in Residual Networks we learn from F(X) and our target is to make F(X) =0 then only we can make input =output.

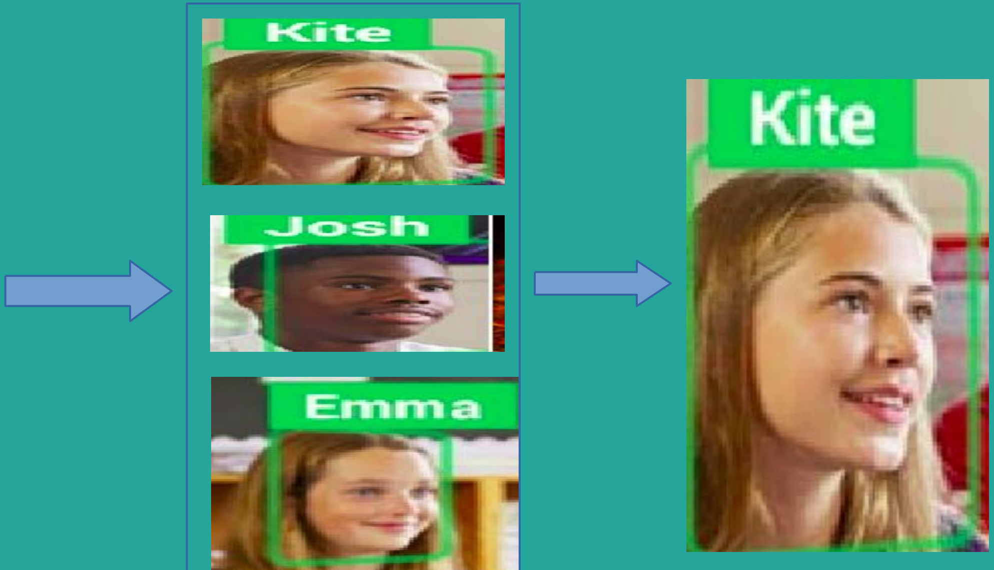


Face recognition

We have face embeddings for each face in Image.Whenever we pass new face to the system,it calculates its face embeddings and compare it with the ones we already have.

Comparison based on subtraction of known encodings with unknown image encodings. It uses l2 norm.

$$|\mathbf{x}| = \sqrt{\sum_{k=1}^{n} |x_k|^2}$$



Results

data collection

Face detection in group photo

	SL NO :	ID Number	Name	CONTACT NO :	SEATING:	Email Address
45	46	R161665	TOTIMEDI POOJITHA	9121747697	E5	r161452@rguktrkv.ac.in
8	9	R161115	SIREESHA OREE	9515693047	A8	r161115@rguktrkv.ac.in
42	43	R161618	TAPPETA SAISUMA	9502484057	E2	r161618@rguktrkv.ac.in
48	49	R161786	BUDUR RADHA	9912811363	E8	r161786@rguktrkv.ac.in
49	50	R161796	DIVYA KANAKA	9618364913	E9	r161796@rguktrkv.ac.in
32	33	R161460	KATHULURU ANJANAMMA	7032654307	D2	r161460@rguktrkv.ac.in
0	1	R161001	K.SHAHEENA	8500679490	A0	r161001@rguktrkv.ac.in
57	58	R161875	CHANDRASEKHAR GARI REKHA	8790087262	F7	r161875@rguktrkv.ac.in
33	34	R161463	GUNAVATHI N	7780213734	D3	r161463@rguktrkv.ac.in
55	56	R161840	D REDDY SEKHAR ACHARI	8501954500	F5	r161840@rguktrkv.ac.in
21	22	R161249	KUNTUMALLA MAHESH	9490902091	C1	r161249@rguktrkv.ac.in
9	10	R161120	PAPA SUNANDA	9160659438	A9	r161120@rguktrkv.ac.in
14	15	R161181	DEVALAMVARDHI BHANU PRAKASH	9441618433	B4	r161181@rguktrkv.ac.in
19	20	R161235	NAMBI BHARATHKUMAR	9573475437	B9	r161235@rguktrkv.ac.in
42	43	R161618	TAPPETA SAISUMA	9502484057	E2	r161618@rguktrkv.ac.in
13	14	R161160	G JAYANTHI	7013896937	B3	r161160@rguktrkv.ac.in
24	25	R161322	PANCHADA CHANDINI	8639805282	C4	r161322@rguktrkv.ac.in
35	36	[illegible]	[illegible]	9618278734	D5	r161476@rguktrkv.ac.in
15	16	[illegible]	[illegible]	9491859926	B5	r161183@rguktrkv.ac.in
2	3	R161014	PRIYANKA H	8978238087	A2	r161014@rguktrkv.ac.in
17	18	R161220	C S SANGEETHA	7995624450	B7	r161220@rguktrkv.ac.in
11	12	R161143	MOHAMMAD RAFI PATNOOL	8978765675	B1	r161143@rguktrkv.ac.in
5	6	R161022	MULLA SEHARABANU	8465803524	A5	r161022@rguktrkv.ac.in

Attendance marking