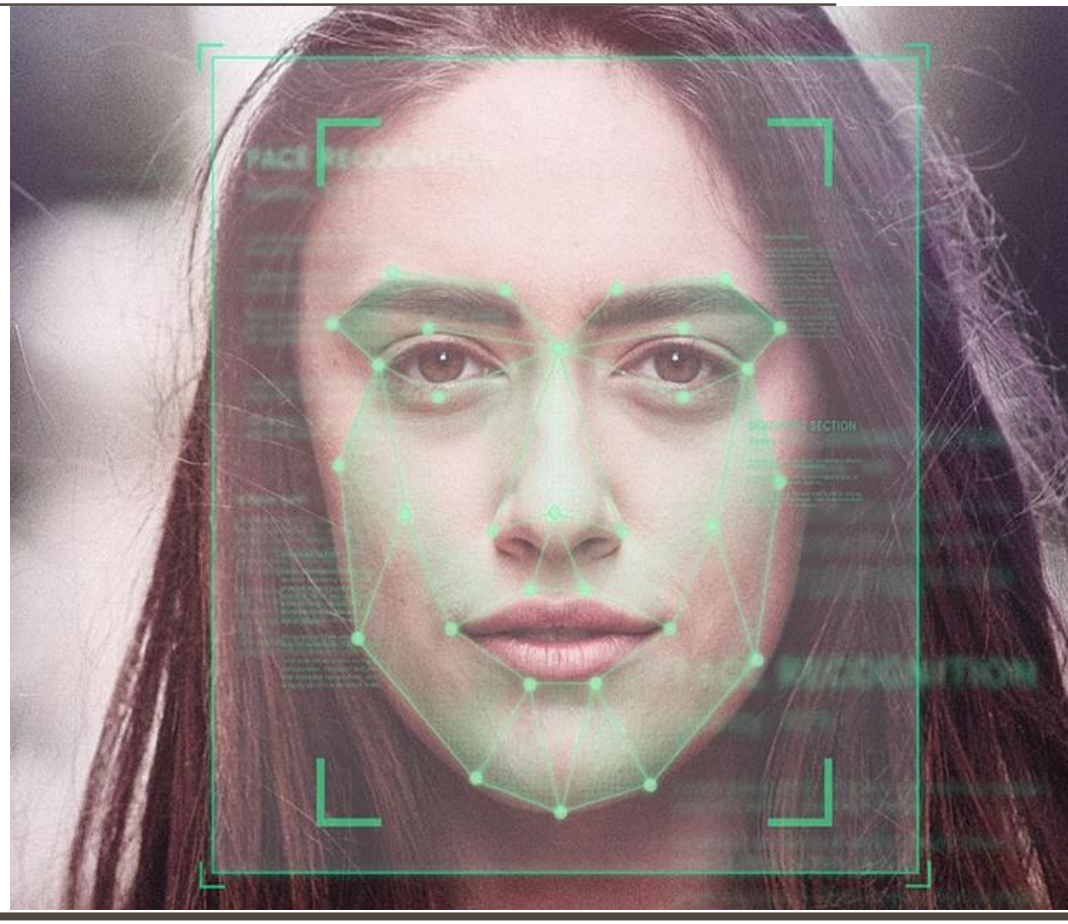
FACE ATTENDANCE CHECKING

Course: EE3063 - Dr. Pham Viet Cuong

Conducted by Group 09

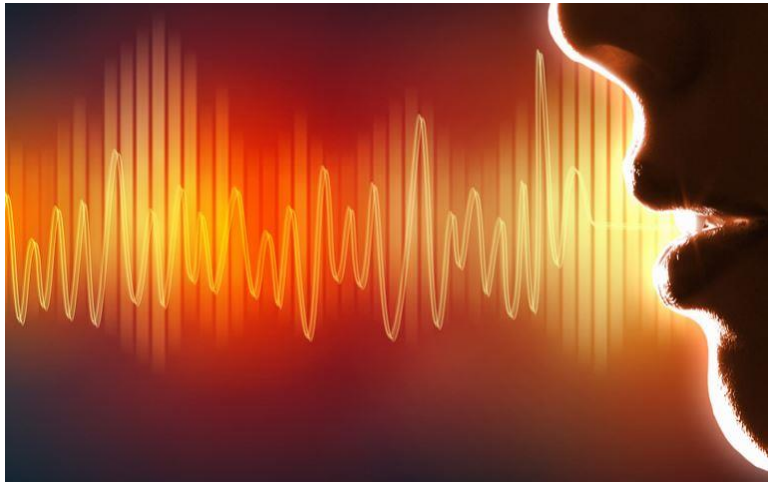
21/11/2018

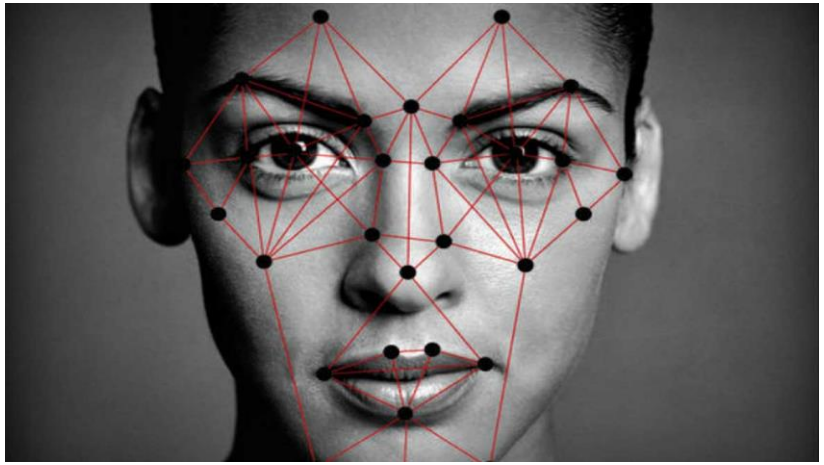


Content

- Problem definition
- Literature review
- Implementation
- Experimental results
- Demo

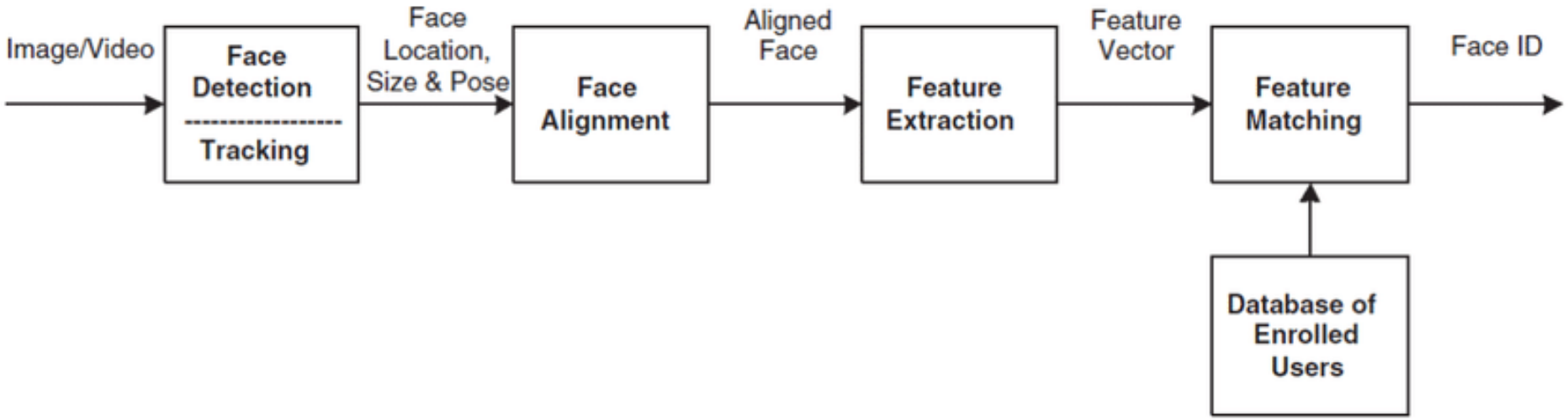
Problem definition





Problem definition

Problem definition



Problem definition

Constraints:

- Single face
- Frontal view
- Standard webcam (480x640)
- Open-set recognition

Members

https://github.com/AntiAegis/Face-Attendance-System

Literature review

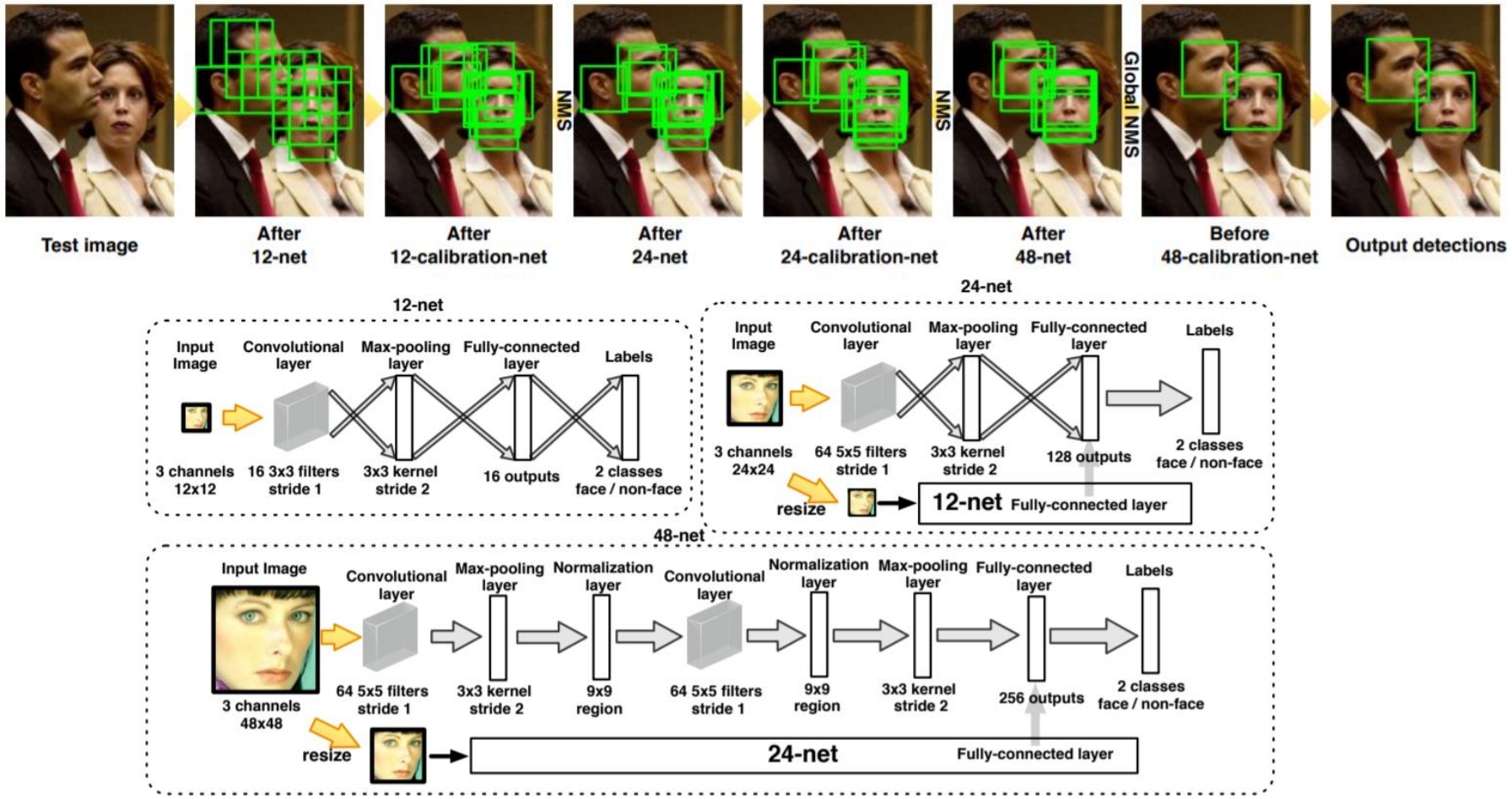
A. Relative works

1. Face Detection and Alignment

The face detector proposed by Viola and Jones used Haar-Like features and AdaBoost algorithm to train cascaded classifiers

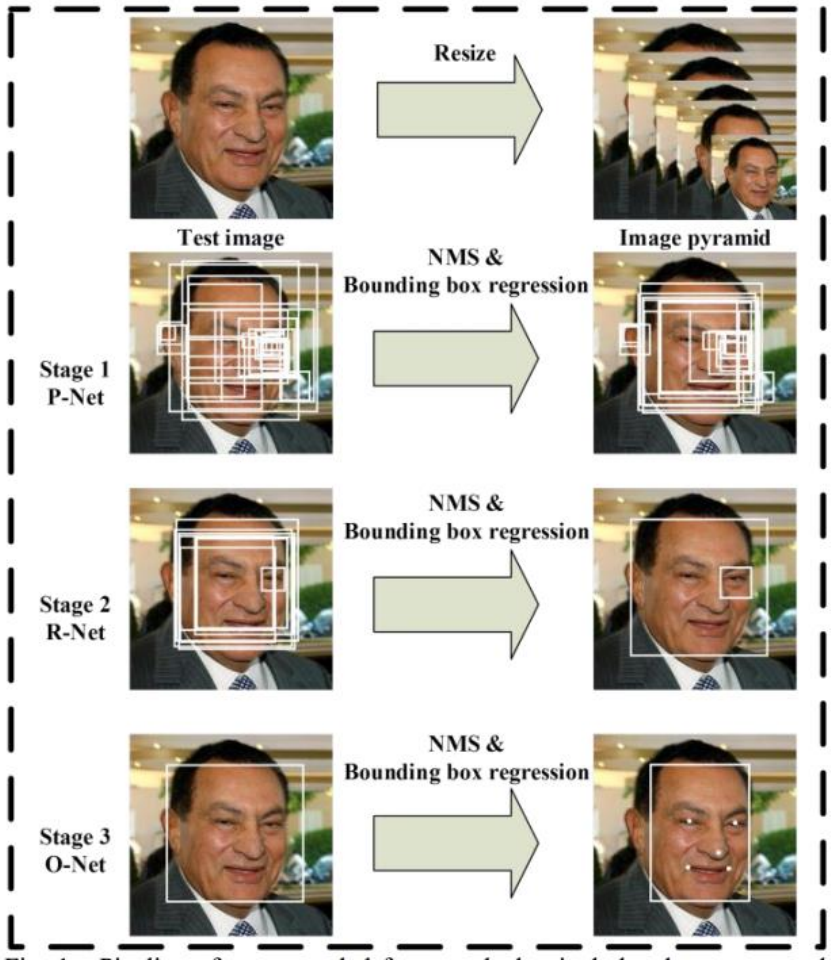
Literature review

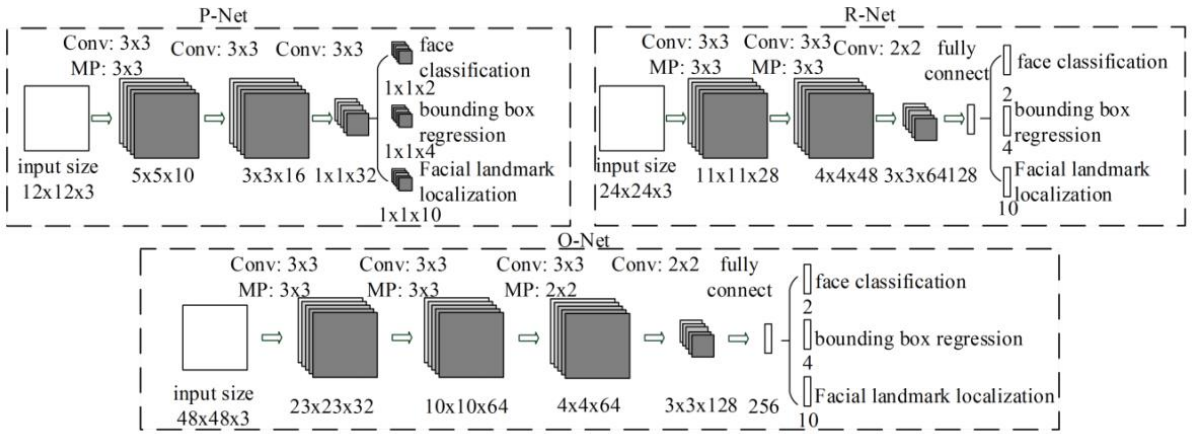
A Convolutional Neural Network Cascade for Face Detection



Literature review

Multi-task Convolutional Network





The learning objective is formulated as a regression problem, and the Euclidean loss:

$$L_i^{box} = \|y_i^{prediction} - y_i^{truth}\|_2^2$$

Literature review

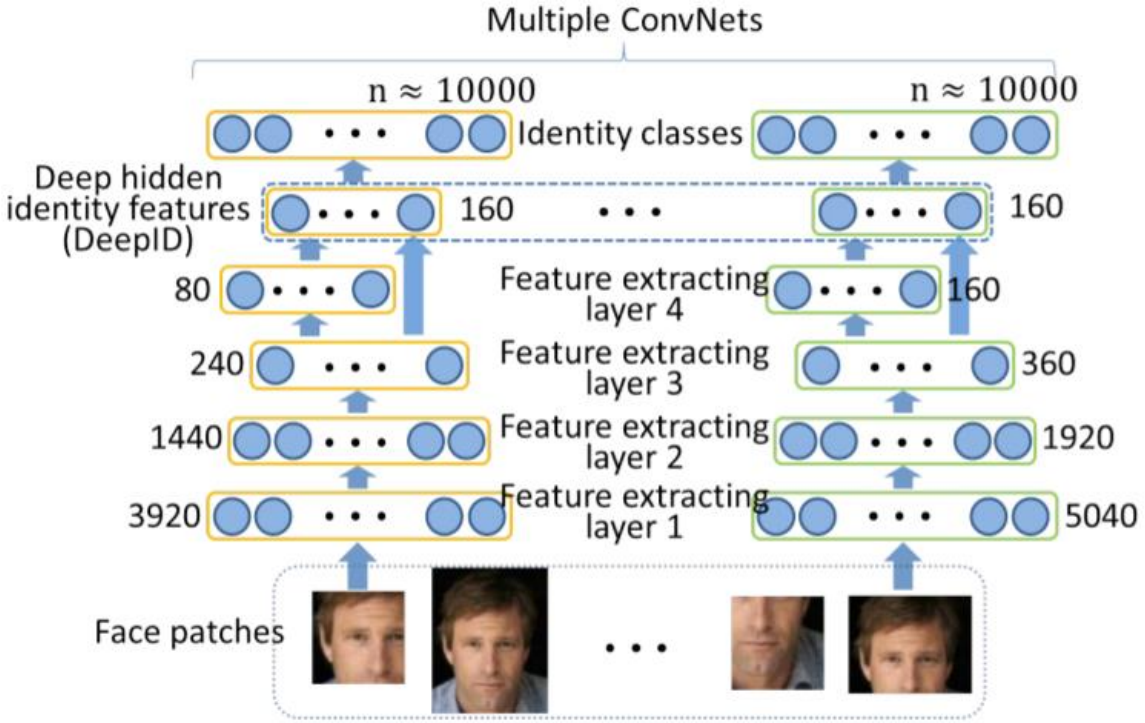
A. Relative works

2. Face Recognition

Method	Net. Loss	Outside data	# models	Aligned	Verif. metric	Layers	Accu.
DeepFace [97]	ident.	4M	4	3D	wt. chi-sq.	8	97.35±0.25
Canon. view CNN [115]	ident.	203K	60	2D	Jt. Bayes	7	96.45±0.25
DeepID [92]	ident.	203K	60	2D	Jt. Bayes	7	97.45±0.26
DeepID2 [88]	ident. + verif.	203K	25	2D	Jt. Bayes	7	99.15±0.13
DeepID2+ [93]	ident. + verif.	290K	25	2D	Jt. Bayes	7	99.47±0.12
DeepID3 [89]	ident. + verif.	290K	25	2D	Jt. Bayes	10-15	99.53±0.10
Face++ [113]	ident.	5M	1	2D	L2	10	99.50±0.36
FaceNet [82]	verif. (triplet)	260M	1	no	L2	22	99.60±0.09
Tencent [8]	-	1M	20	yes	Jt. Bayes	12	99.65±0.25

Literature review

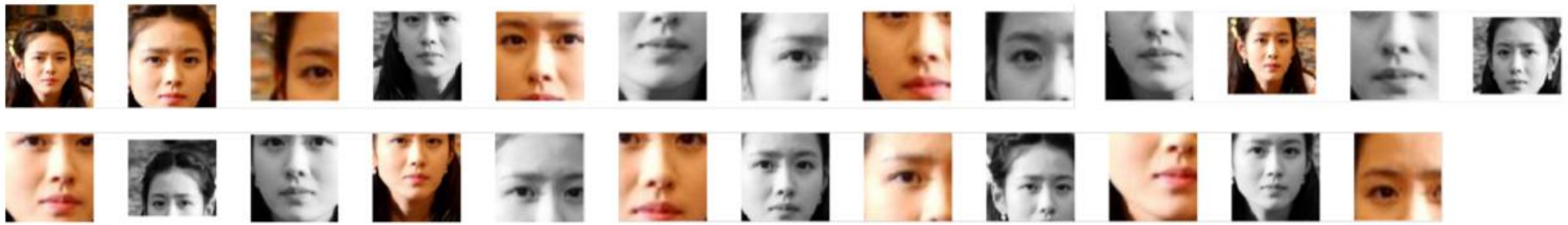
Deep Learning Face Representation from Predicting 10,000 Classes (DeepID 1)



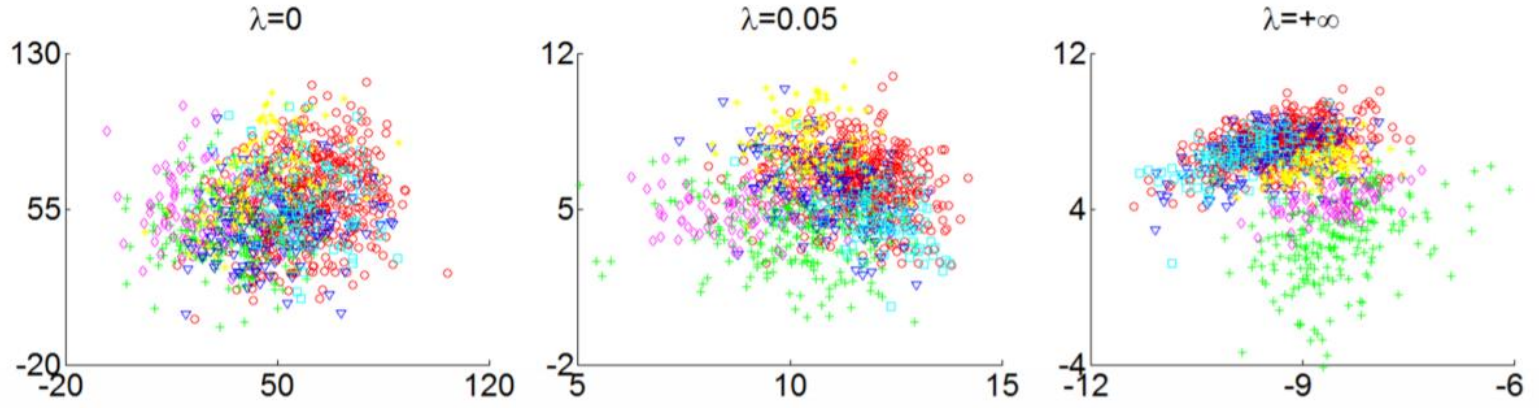
One CNN for a feature extractor. 60 CNNs in total.

Literature review

DeepID 2 (NIPS 2014)

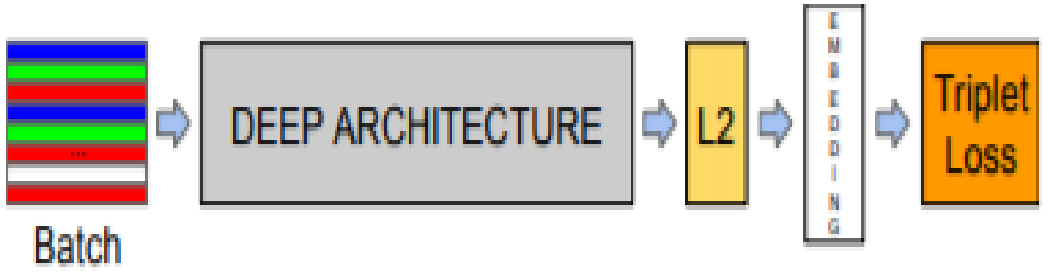


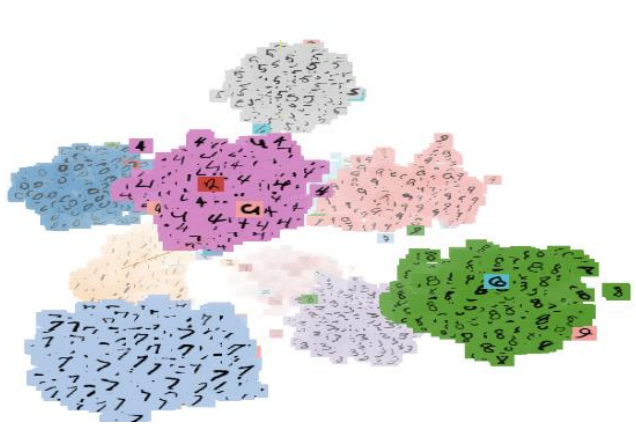
Patches selected for feature extraction



Literature review

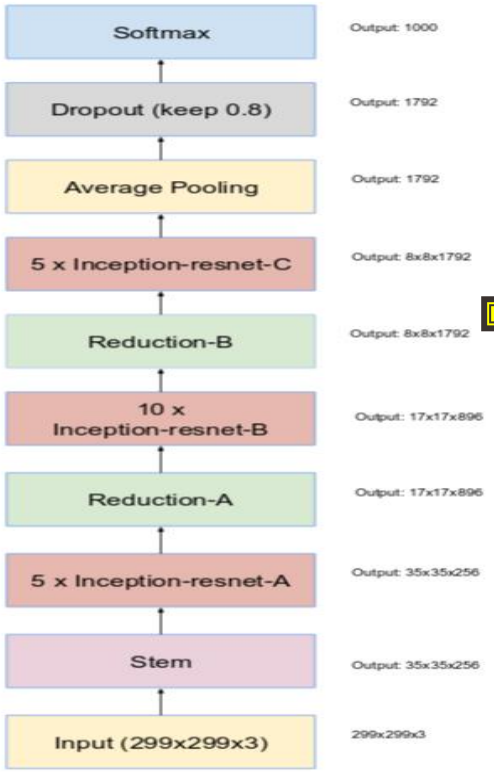
FaceNet

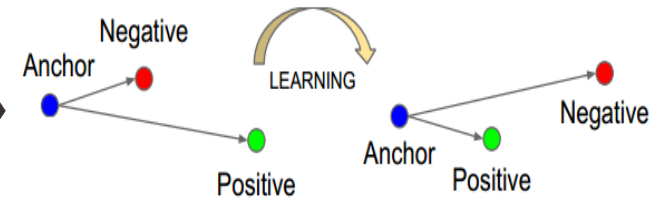




Literature review

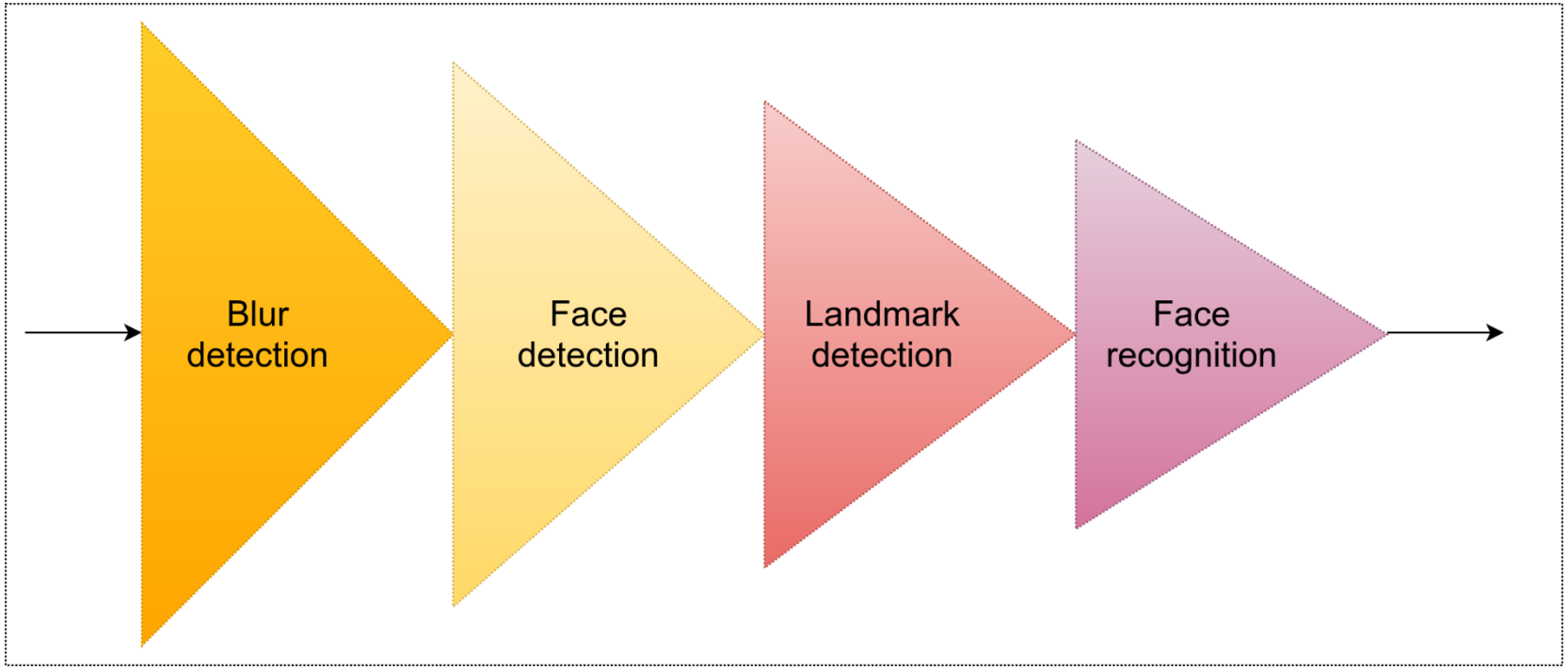
B. Proposal Model





$$loss^{total} = \sum_{i=1}^{n}\sum_{j=1}^{m}(max(0, z_j - (z_i - \Delta))$$

Implementation

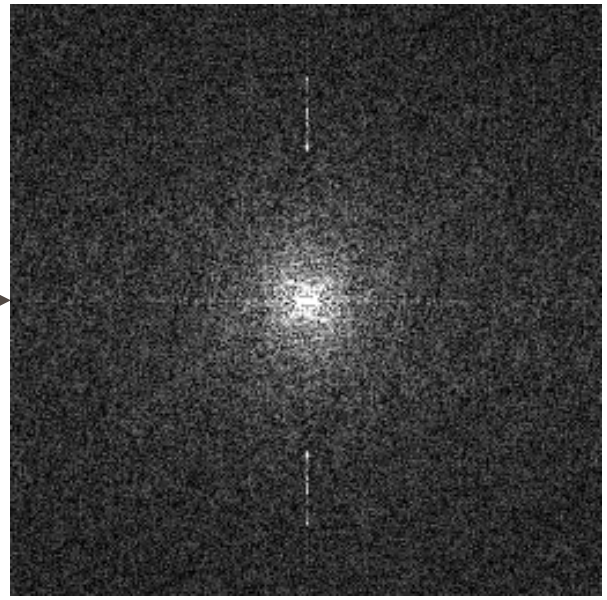


System pipeline

Implementation

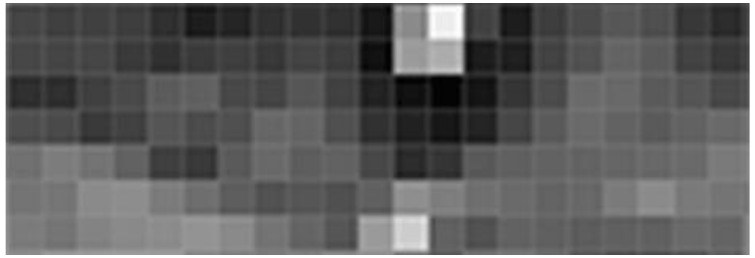
Blur detection

FFT-2D

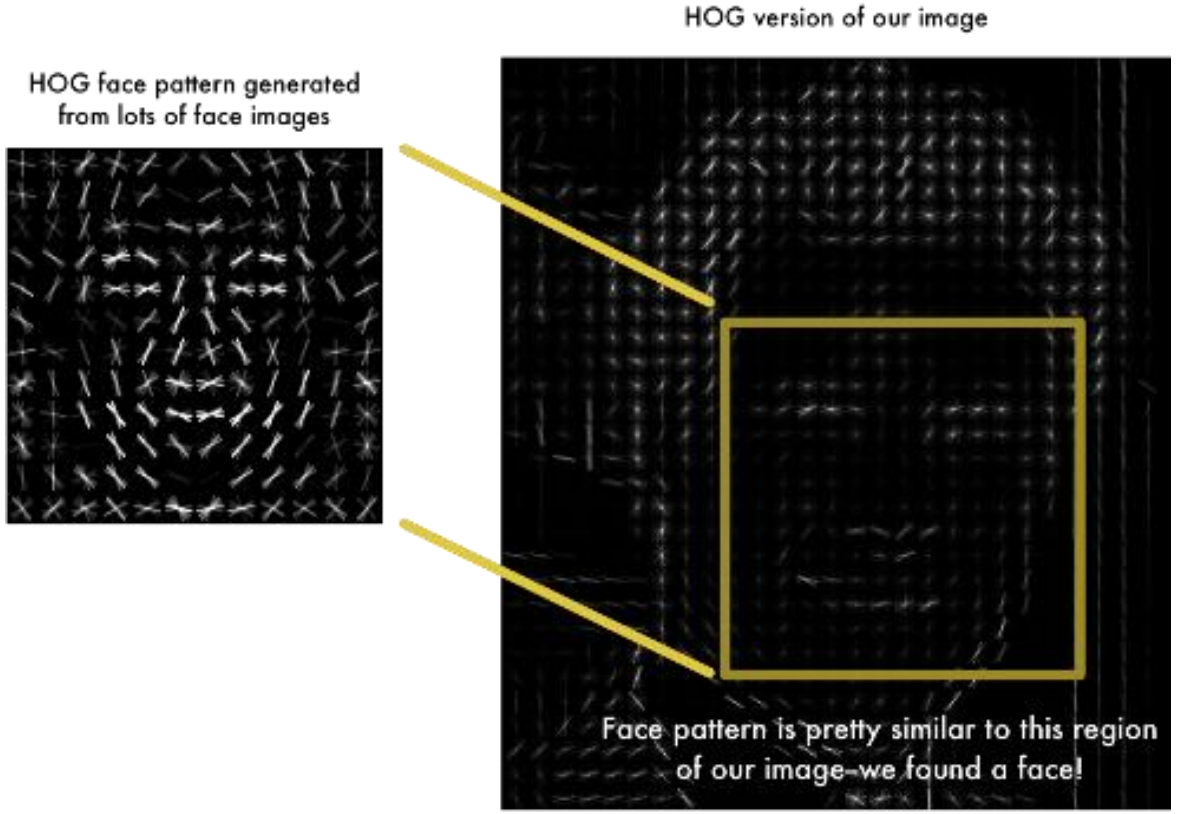


Implementation

Face detection (based on Histogram Of Gradient)

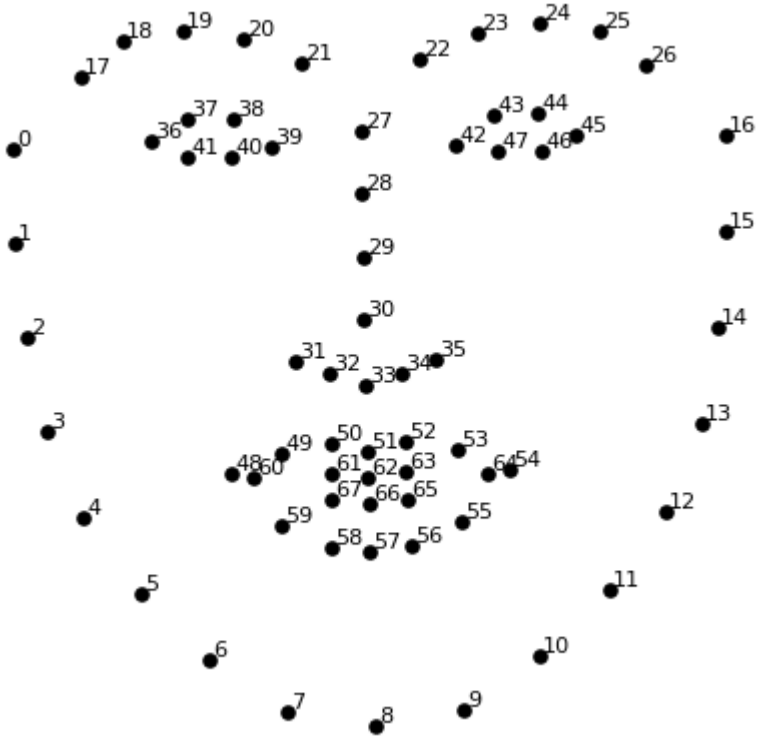


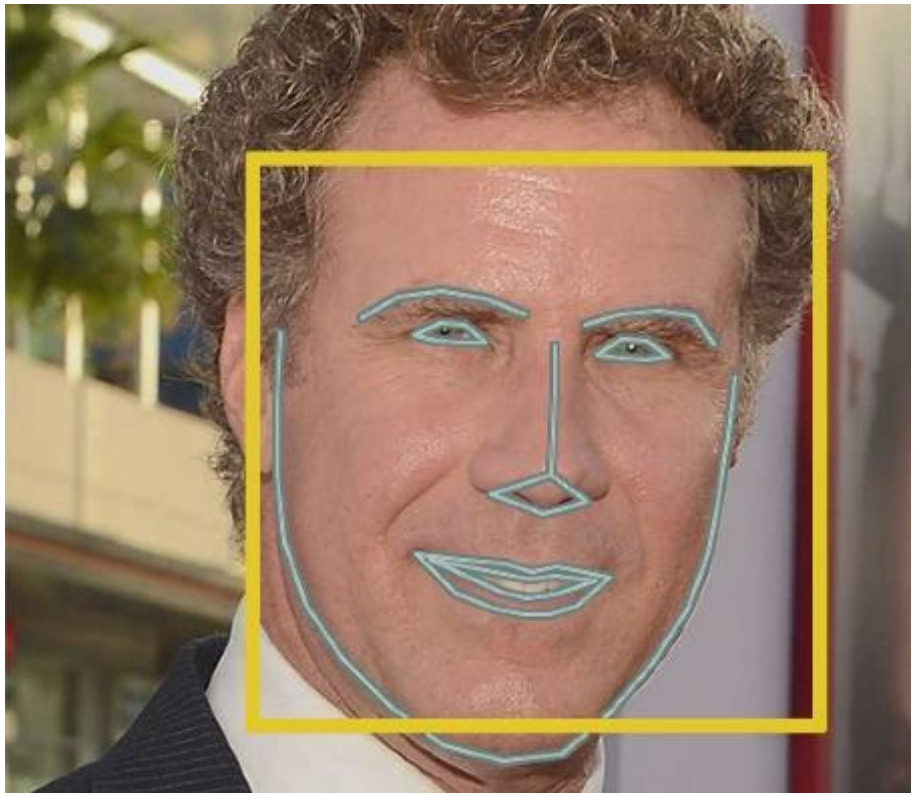
gradient



Implementation

Landmark detection

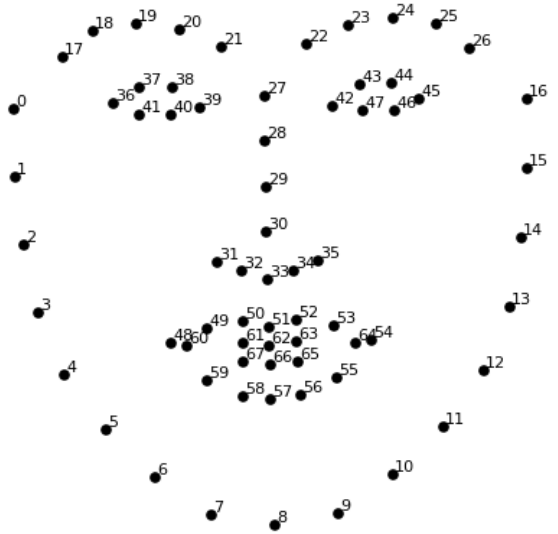




Implementation

Landmark detection

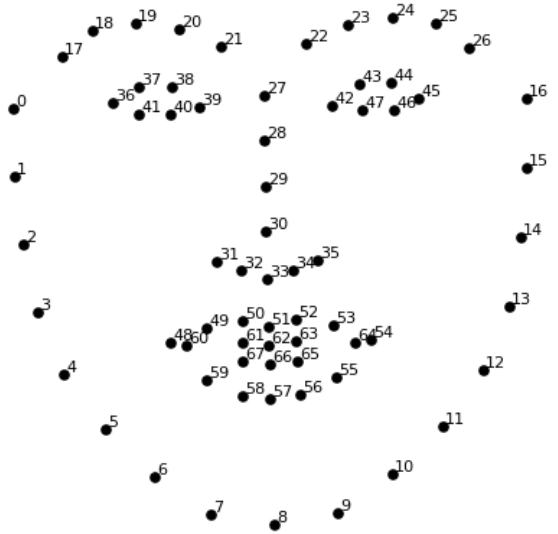
Regressor



Implementation

Landmark detection

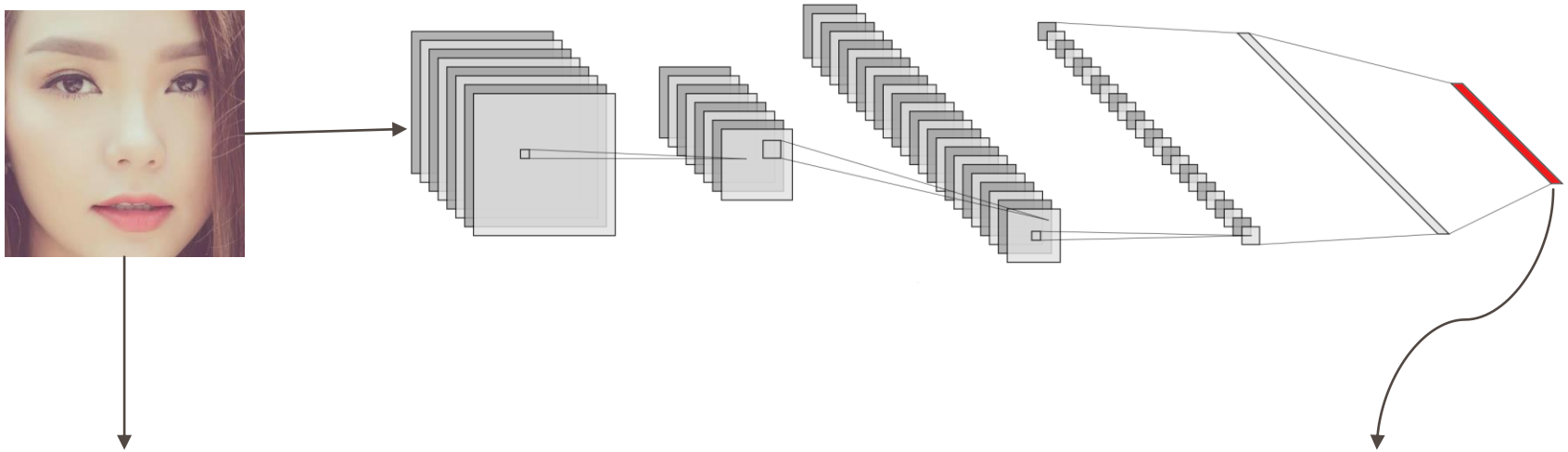
Cascaded regressors



Regressor1 Regressor2 … RegressorN

Implementation

Face recognition



Input image:

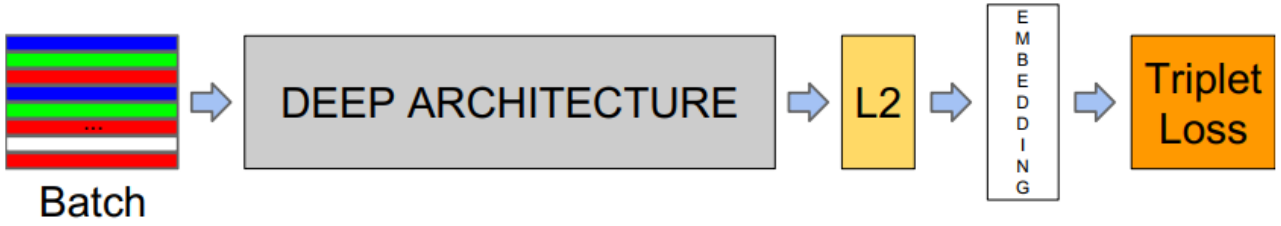
- High-dimensional
- Rich detail

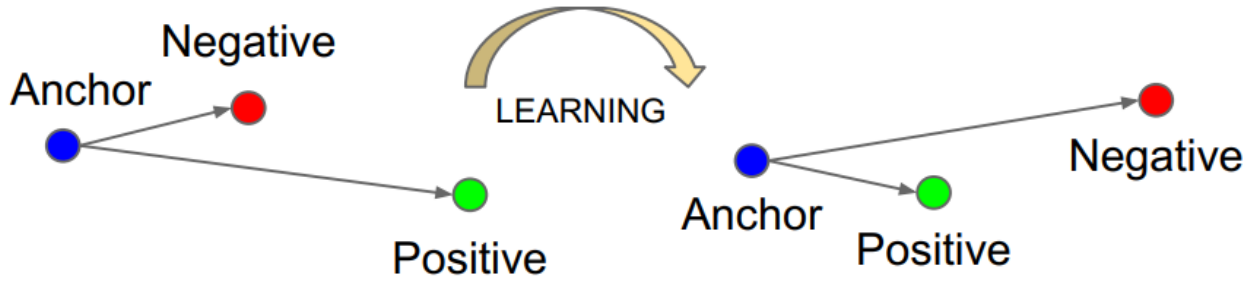
Feature vector:

- Low-dimensional
- Representative

Implementation

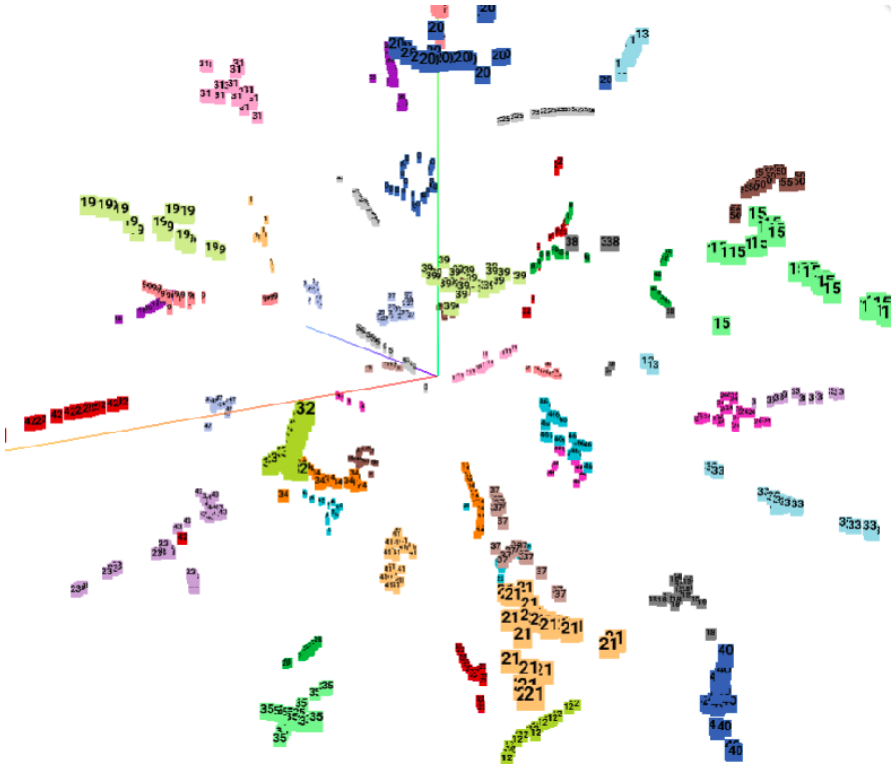
Face recognition (based on FaceNet)

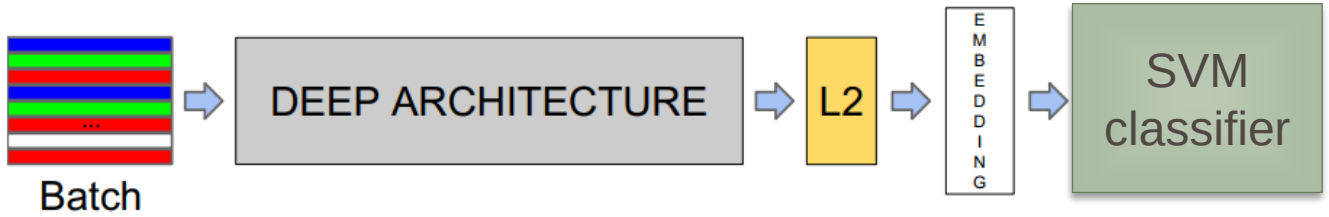




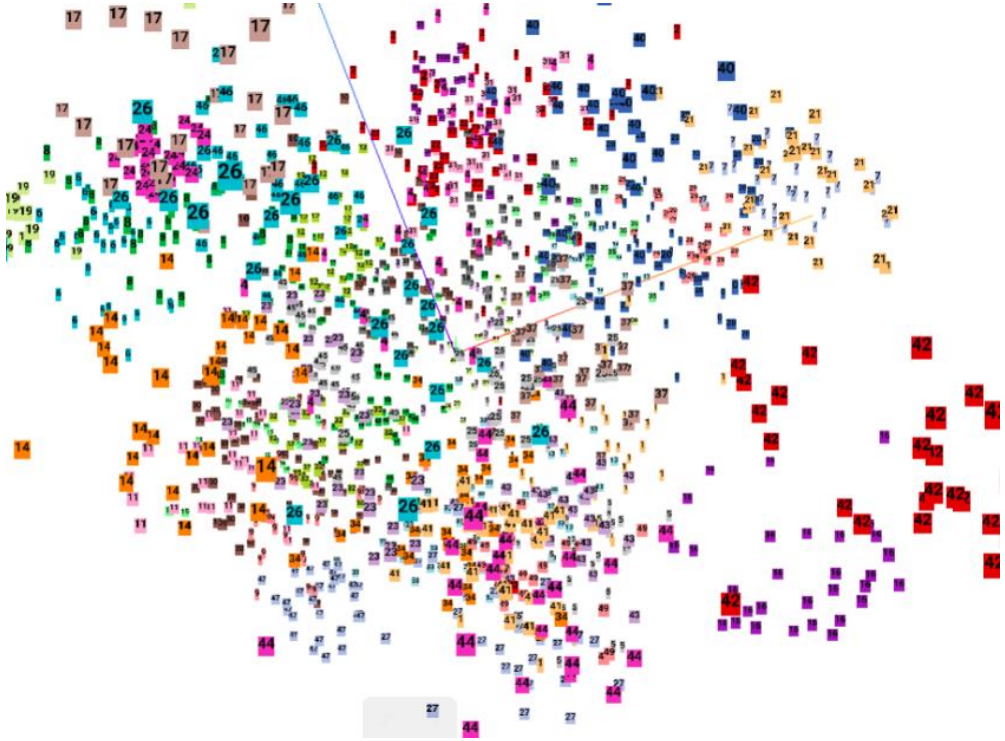
Implementation

Face recognition (based on FaceNet)

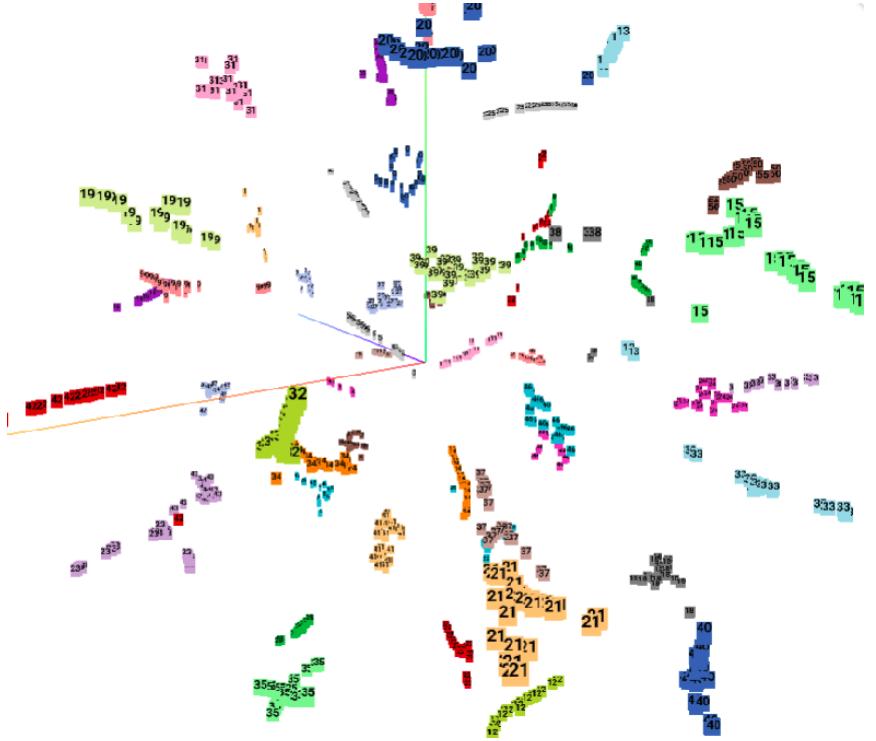




Experimental results

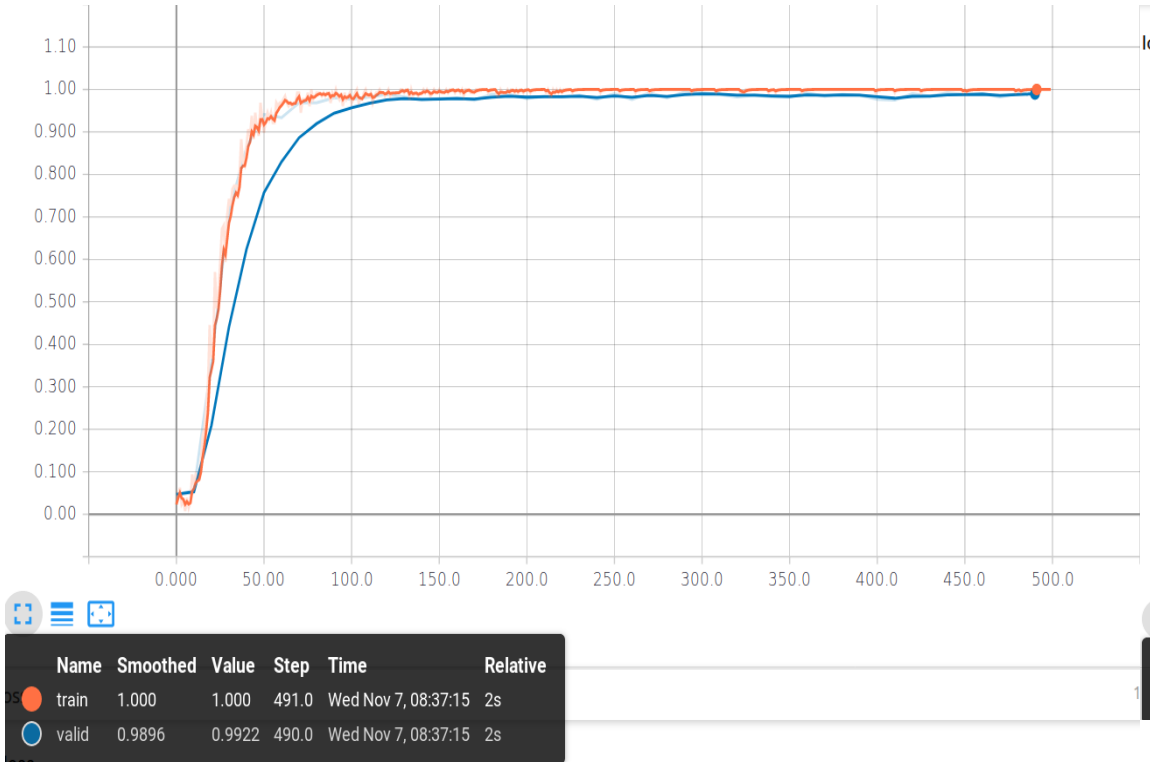


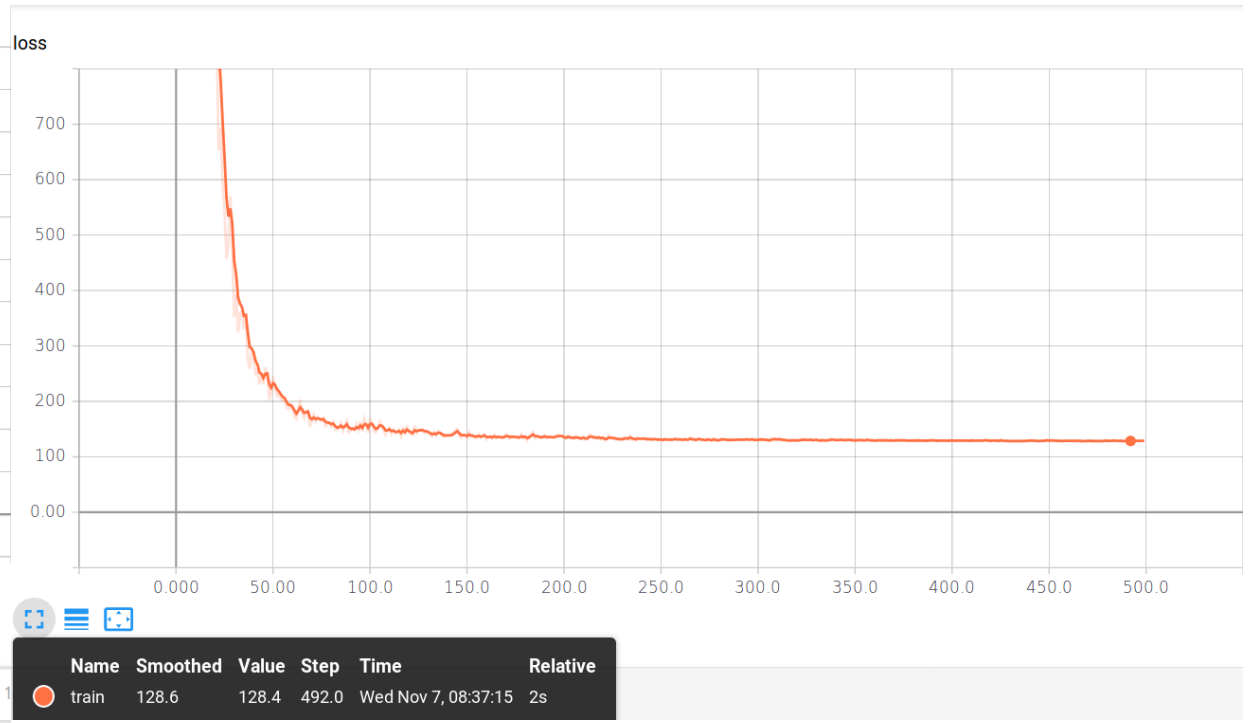
Visualization using PCA



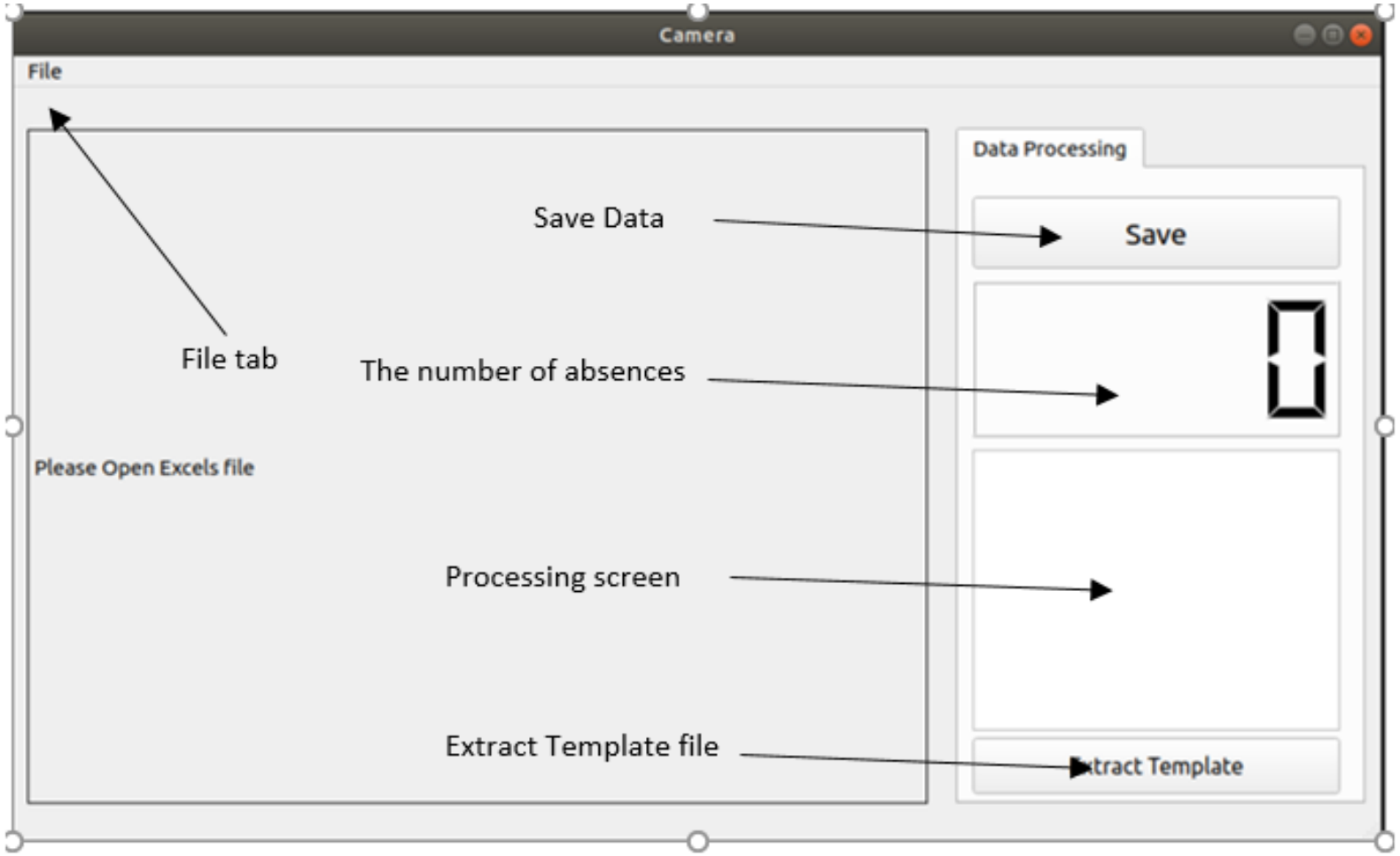
Visualization using t-SNE

Experimental results





Experimental results



Experimental results

DANH SÁCH SINH VIÊN					
TRÍ TUỆ NHÂN TẠO TRONG ĐIỀU KHIỂN					
			1 = present		
			blank = absent		
ID	**Last Name**	**First Name**	**Group**	**09/06/2018**	**Total**
1511844	Lương Hữu Phú	Lộc	1		1
1512221	Phạm Ngọc Khôi	Nguyên	1	1	0
1512396	Bùi Tấn	Phát	1		1
1512534	Nguyễn Trọng	Phúc	1	1	0

Demo

Conclusion

Hard:

- Face Attendance Checking
- Deep-learning based
- Standard hardware
- High accuracy
- Easy-use GUI

Soft:

- Specialized-task assignment
- GitHub: store, collaborate, refer
- Open-source: MIT license
- Scientific-form paper report
- Unity

Acknowledge

- Dr. Pham Viet Cuong: promote a chance.
- Course-EE3063 students: donate data.