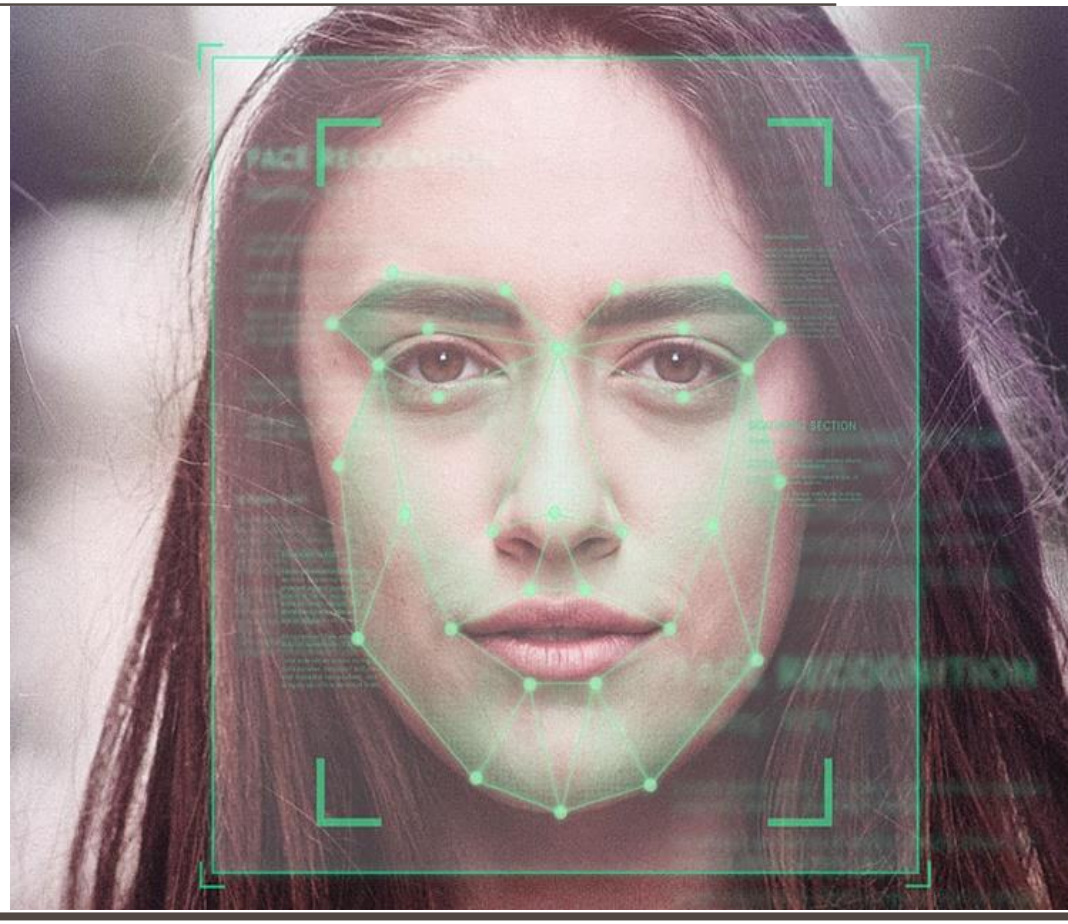
FACE ATTENDANCE CHECKING

Course: EE3063 - Dr. Pham Viet Cuong

Conducted by Group 09

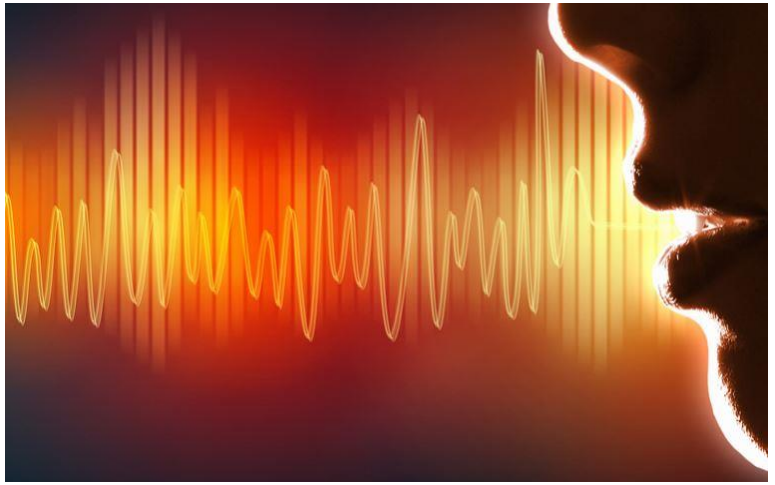
21/11/2018

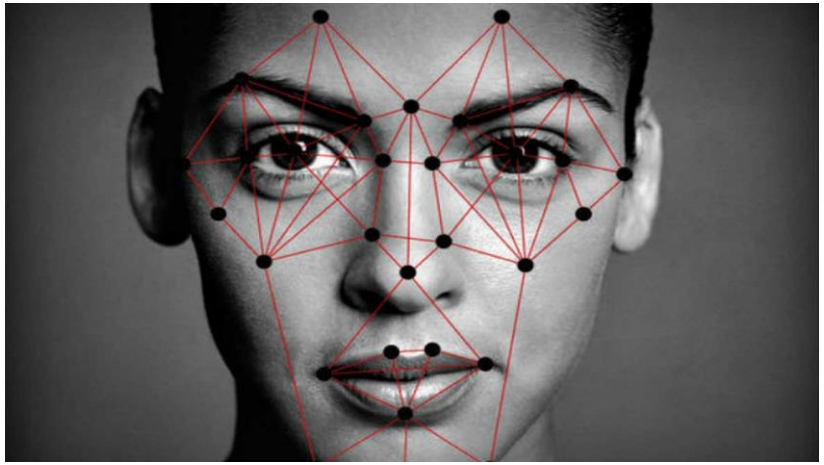


Content

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

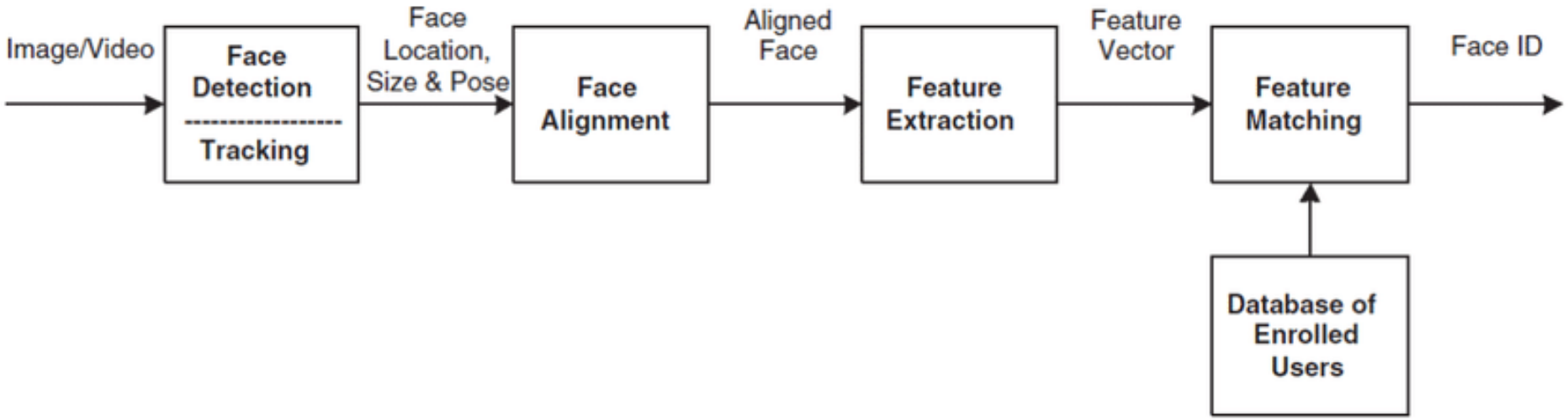
Problem definition





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

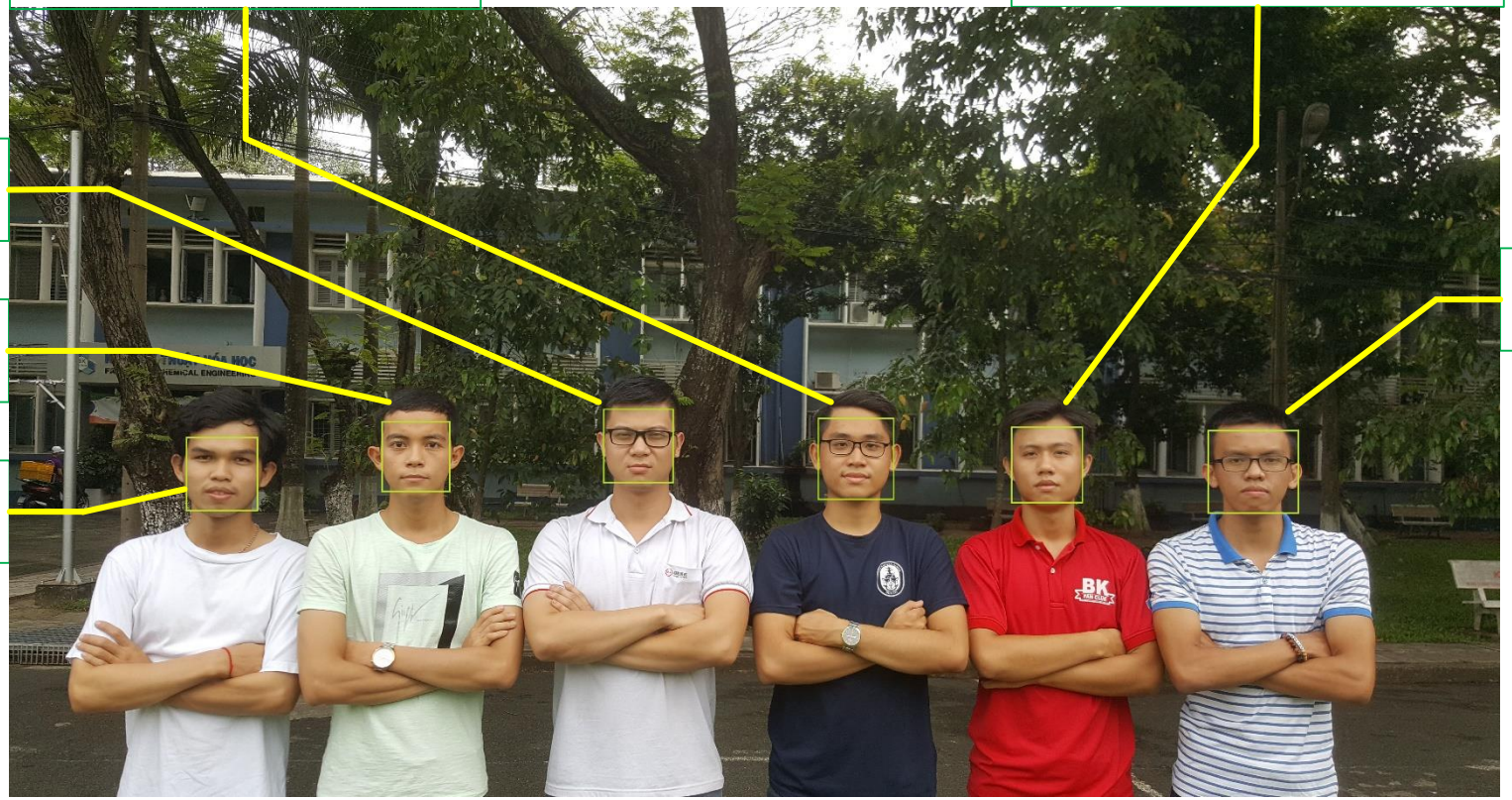
Nguyen Chinh Thuy
work generally, arrage tasks

Do Tieu Thien
Algorithms, *Face Recognition*

Nguyen Tan Sy
Graphic User Interact

Le Van Hoang Phuong
Attention, Attendance Management

Nguyen Van Qui
Face and Landmark Detection



Nguyen Tan Phu
Blur Detection

Literature review

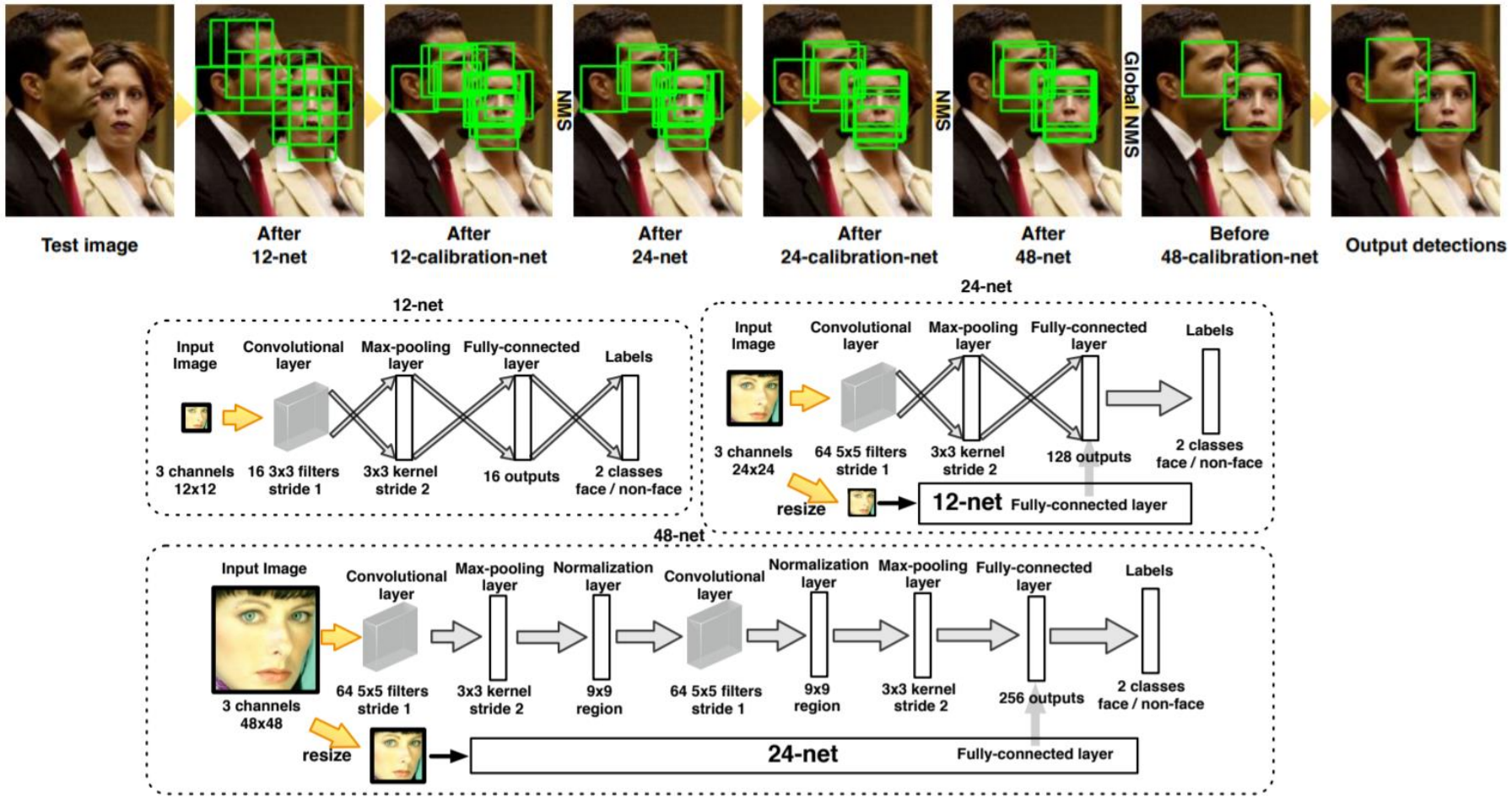
A. Relative works

1. Face Detection and Alignment

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

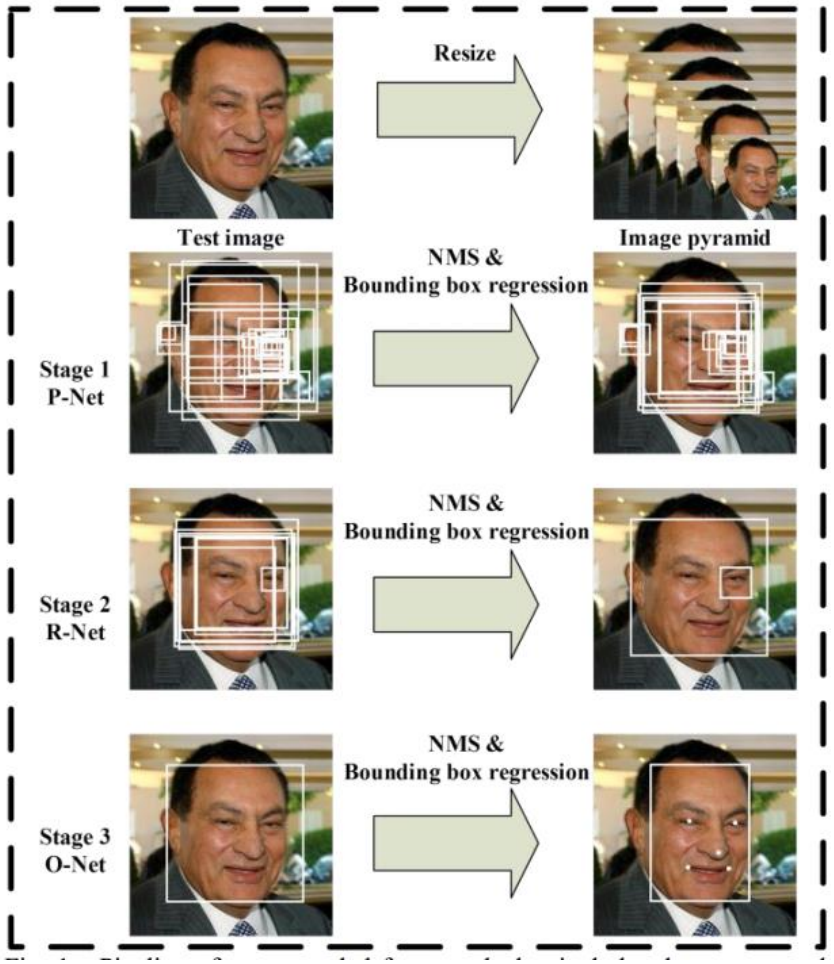
Literature review

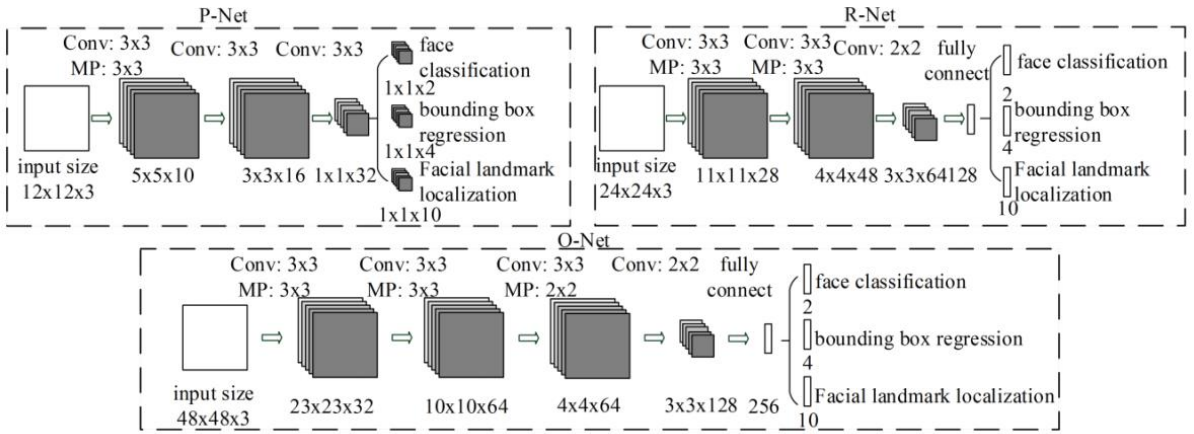
A Convolutional Neural Network Cascade for Face Detection



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

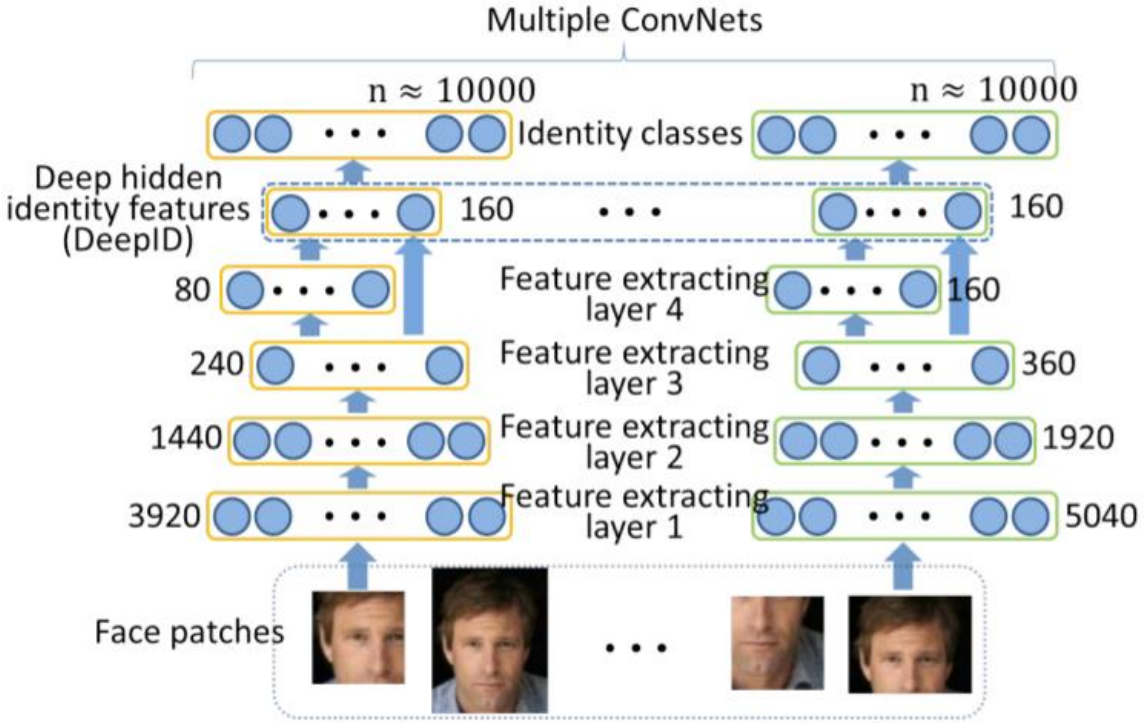
A. Relative works

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

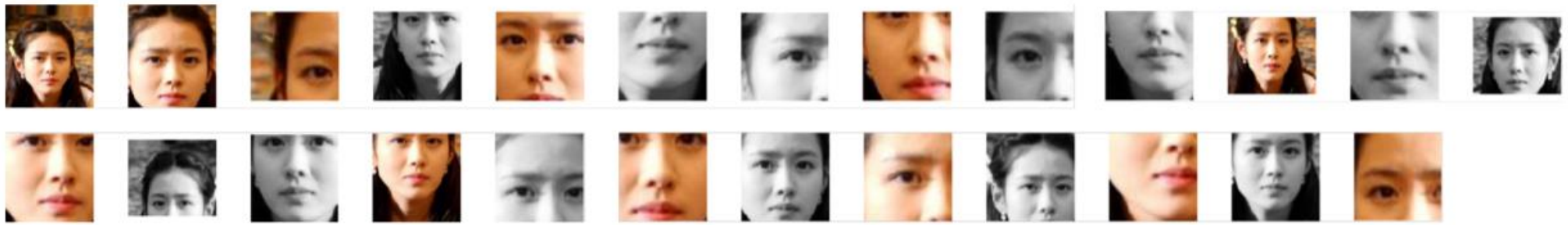
Deep Learning Face Representation from Predicting 10,000 Classes (DeepID 1)



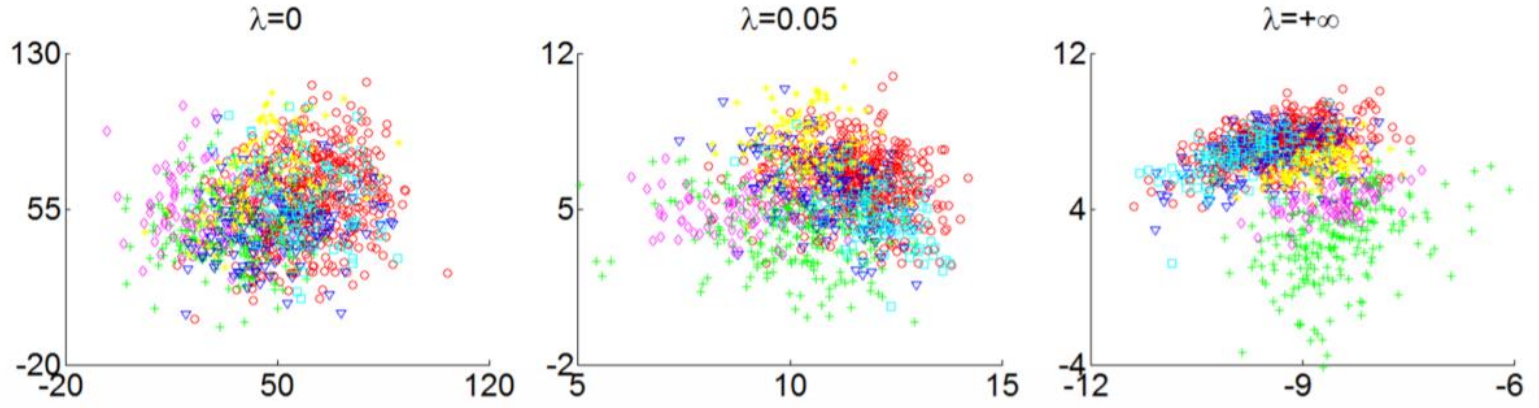
One CNN for a feature extractor. 60 CNNs in total.

Literature review

DeepID 2 (NIPS 2014)

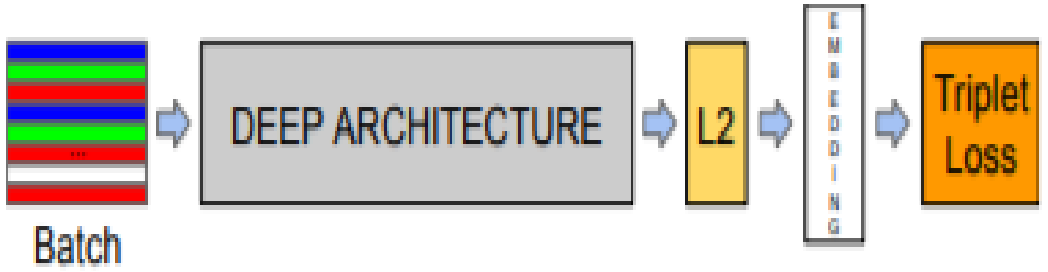


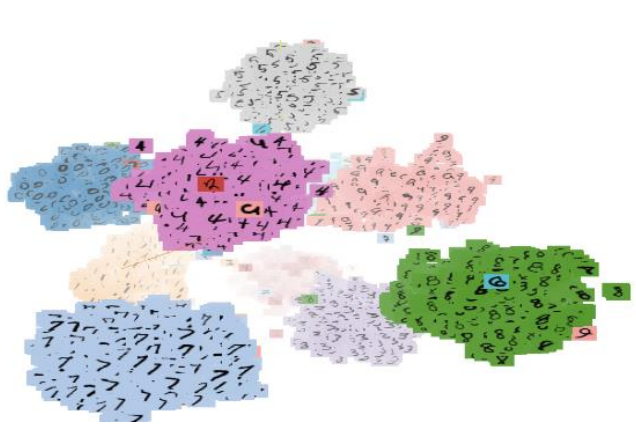
Patches selected for feature extraction



Literature review

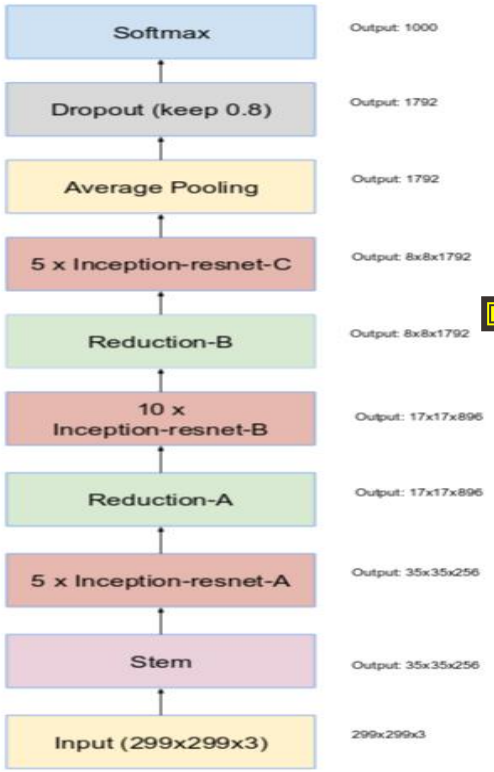
FaceNet

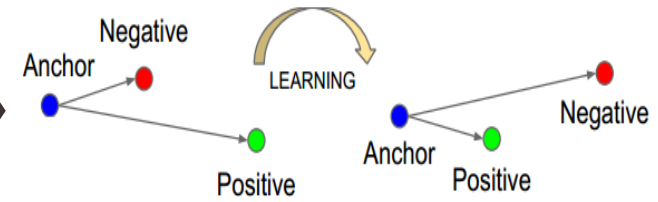




Literature review

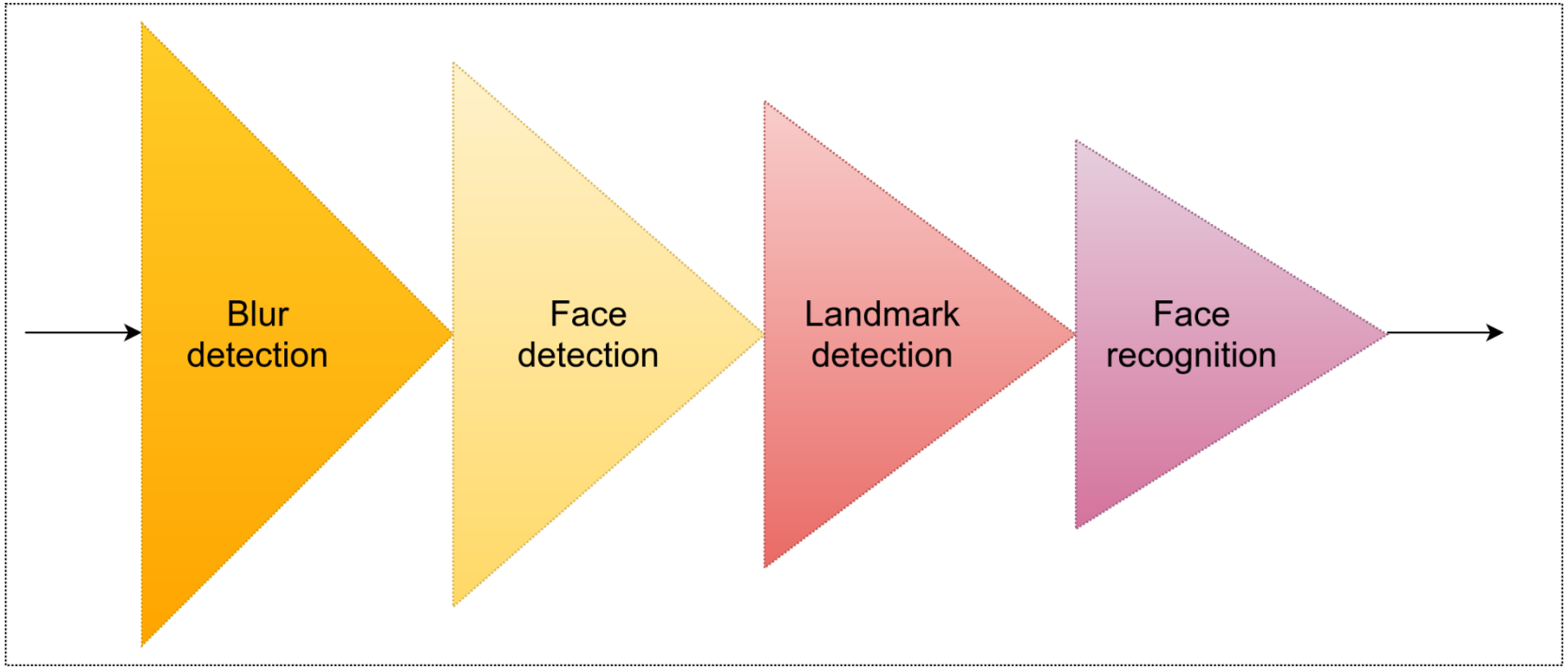
B. Proposal Model





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

Implementation

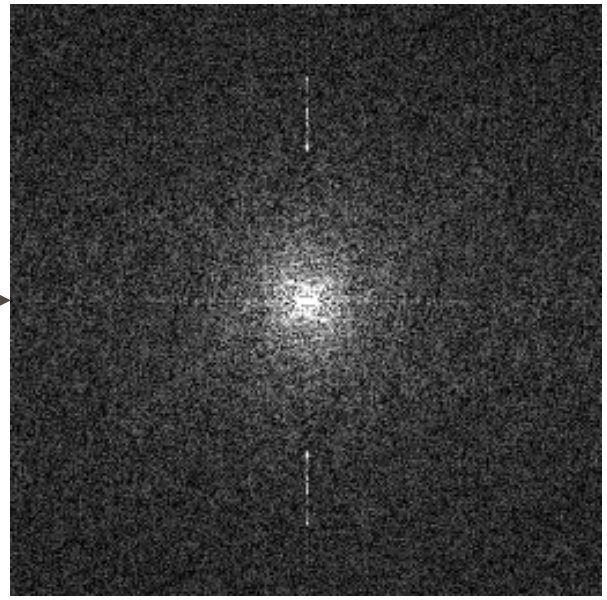


System pipeline

Implementation

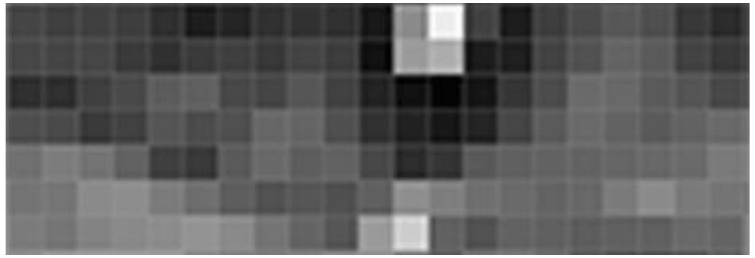
Blur detection

FFT-2D

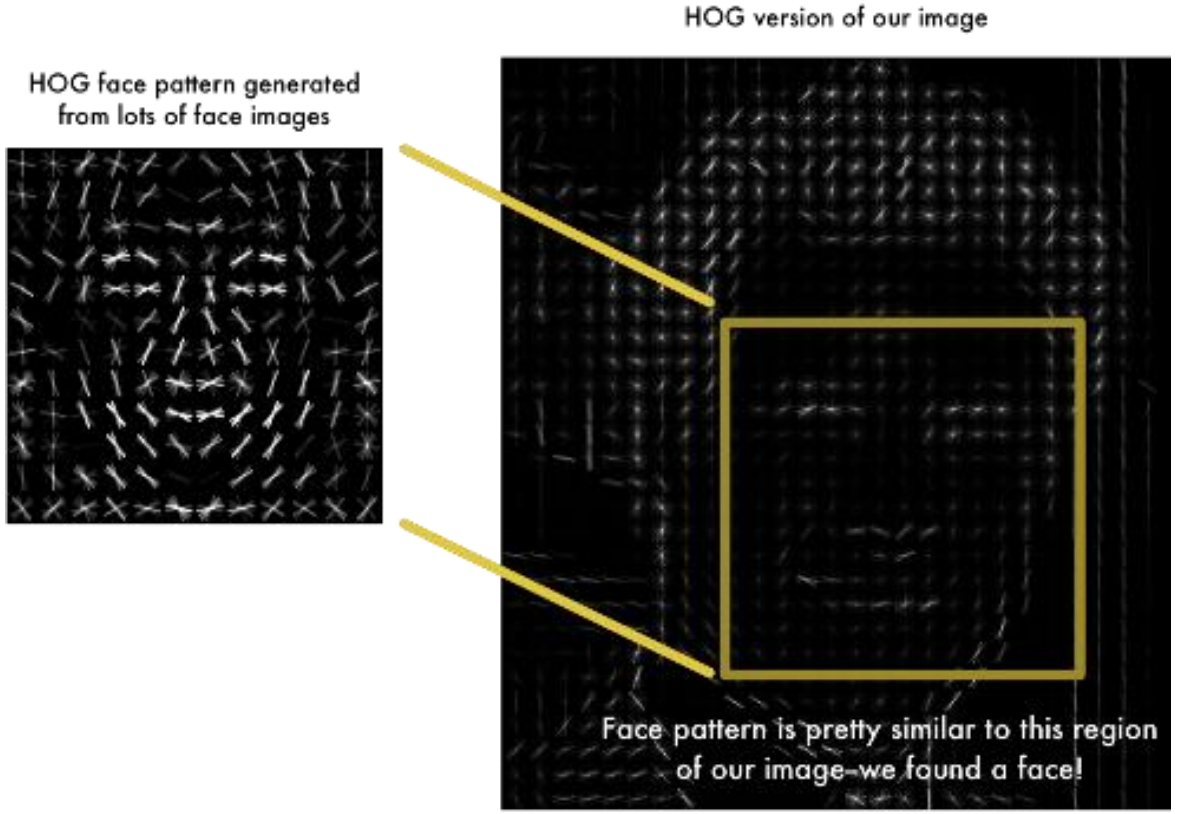


Implementation

Face detection (based on Histogram Of Gradient)

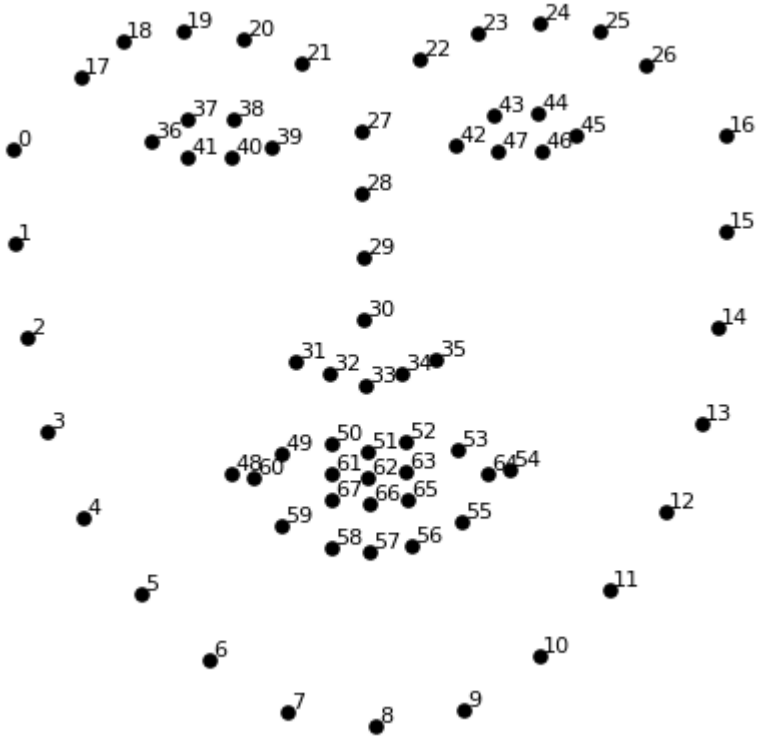


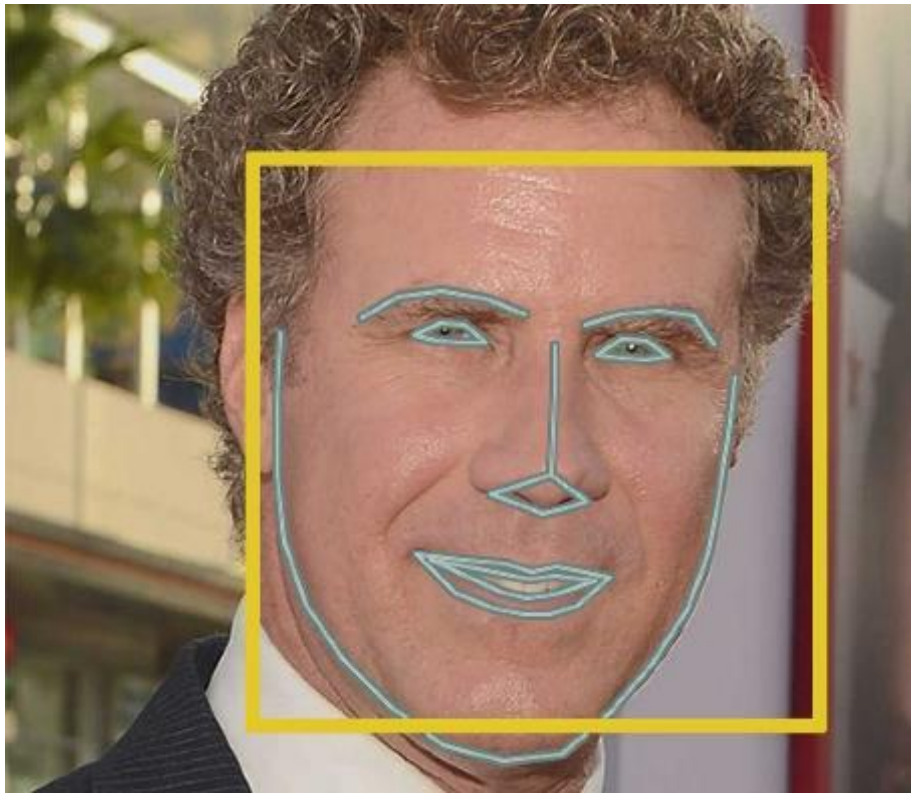
gradient



Implementation

Landmark detection

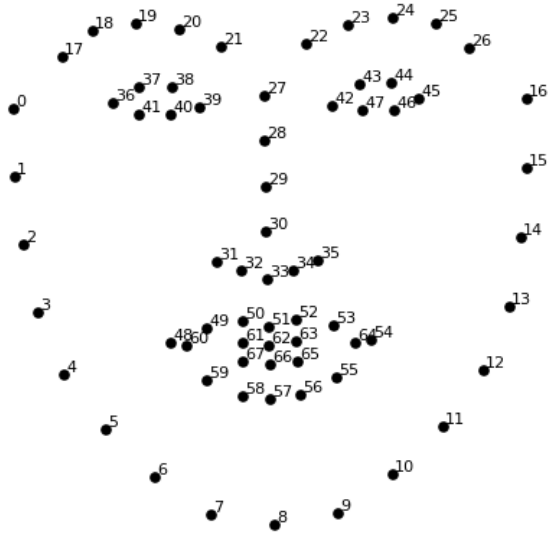




Implementation

Landmark detection

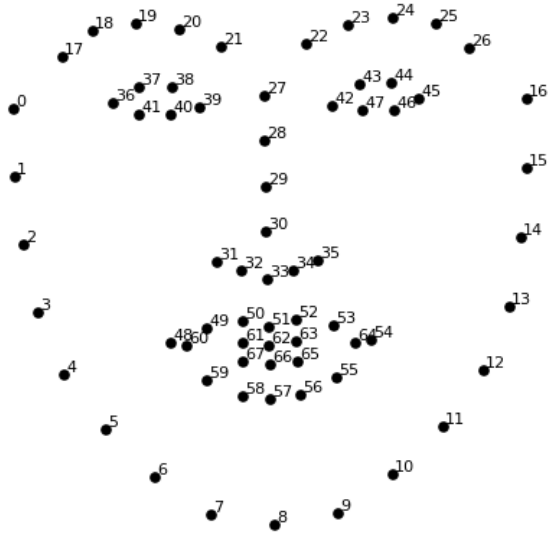
Regressor



Implementation

Landmark detection

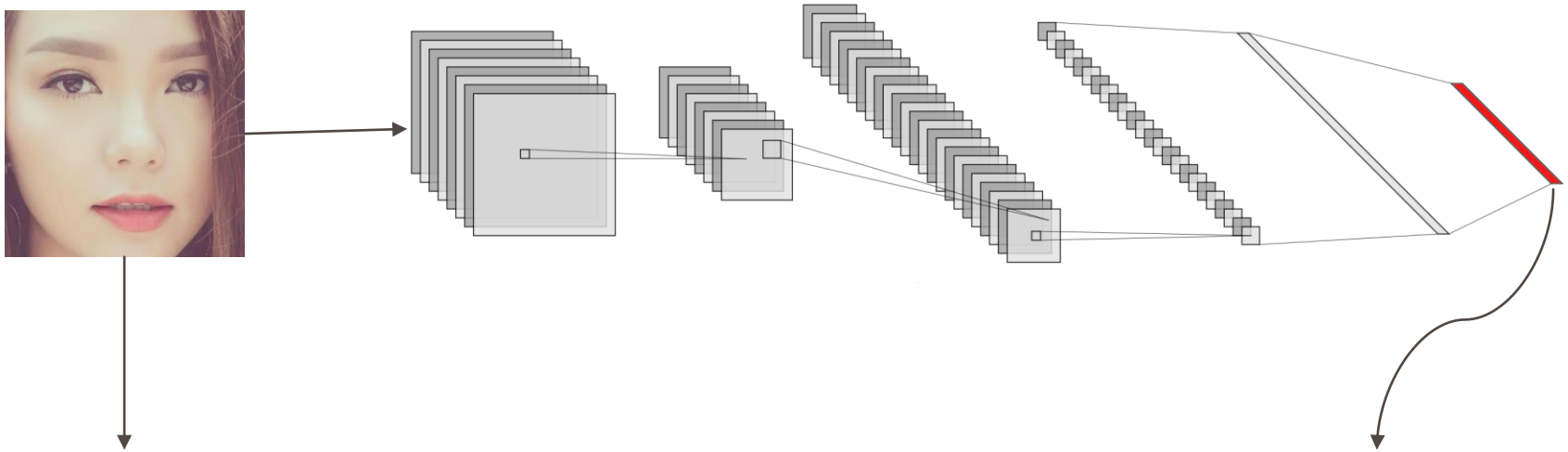
Cascaded regressors



Regressor1 Regressor2 … RegressorN

Implementation

Face recognition



Input image:

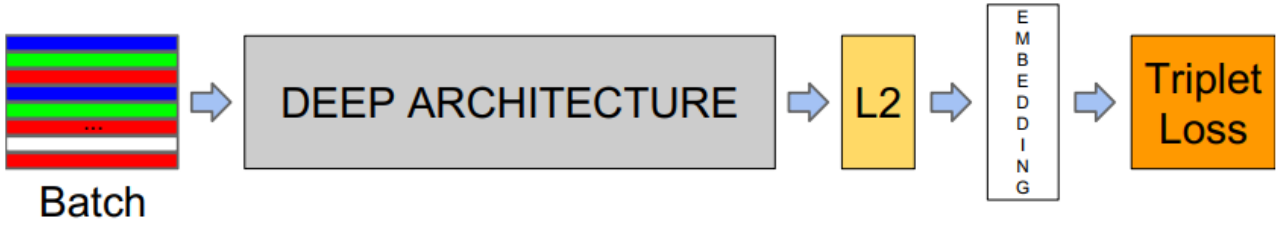
- High-dimensional
- Rich detail

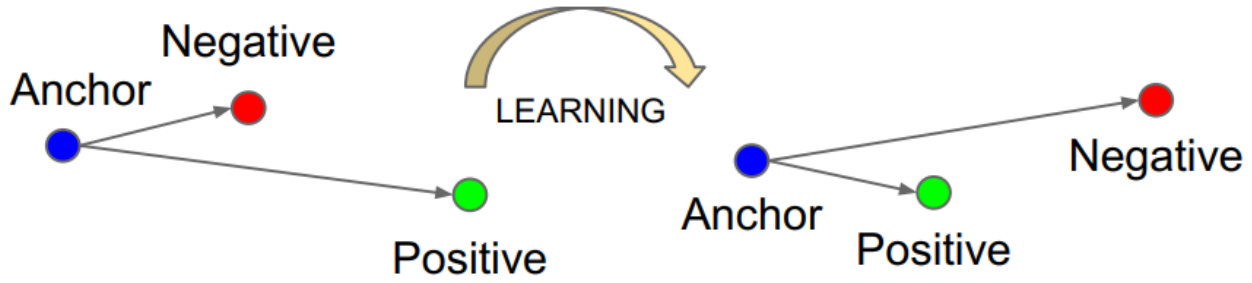
Feature vector:

- Low-dimensional
- Representative

Implementation

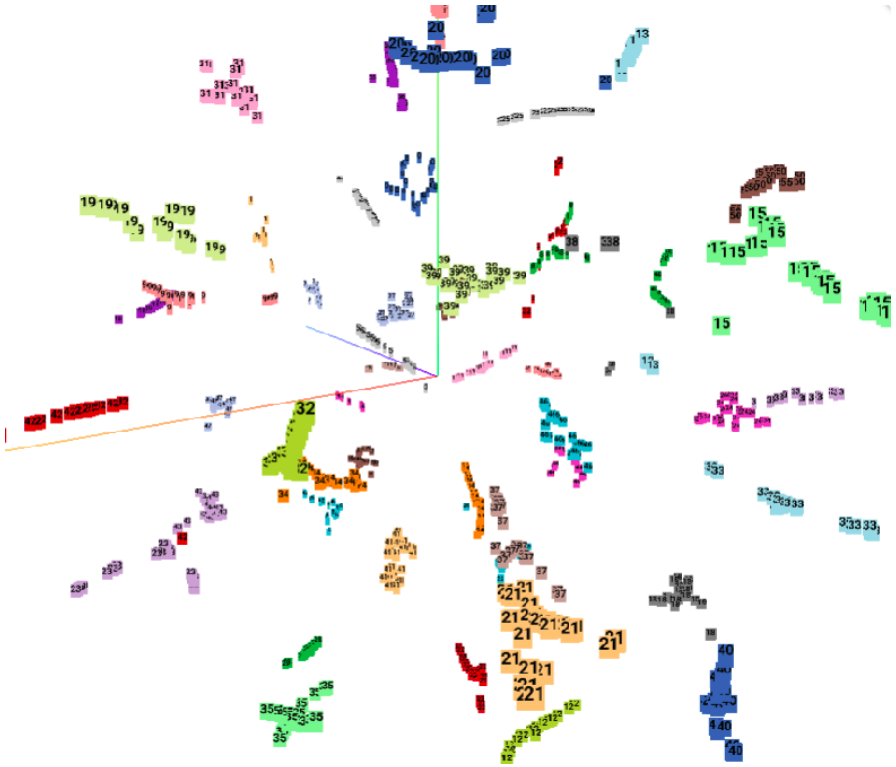
Face recognition (based on FaceNet)

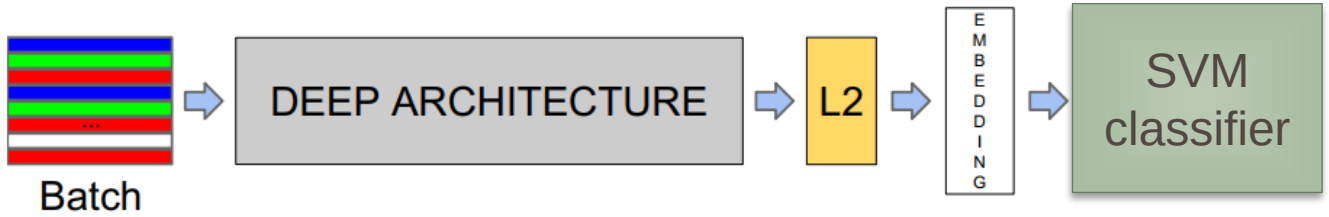




Implementation

Face recognition (based on FaceNet)



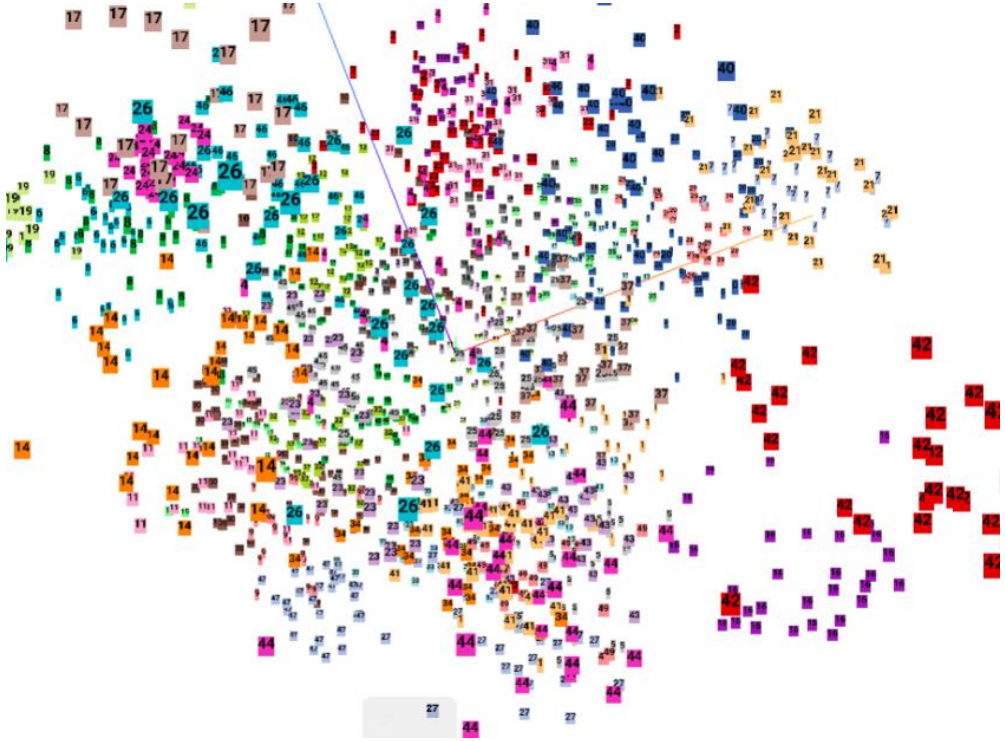


Experimental results

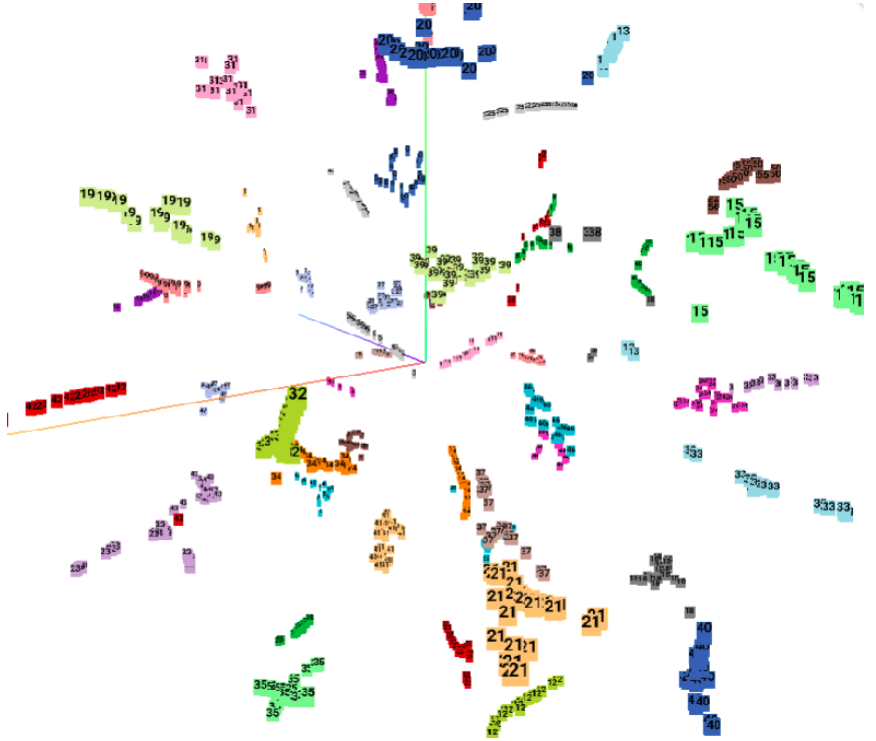
TABLE II. DATASET SUMMARY

Dataset	Subset	#identities	#images per identity	#images totally
Training	-	52	30	1560
Validating	-	52	10	520
Testing	Known (1)	52	20	1040
	Unknown (2)	4069	1	4069

Experimental results

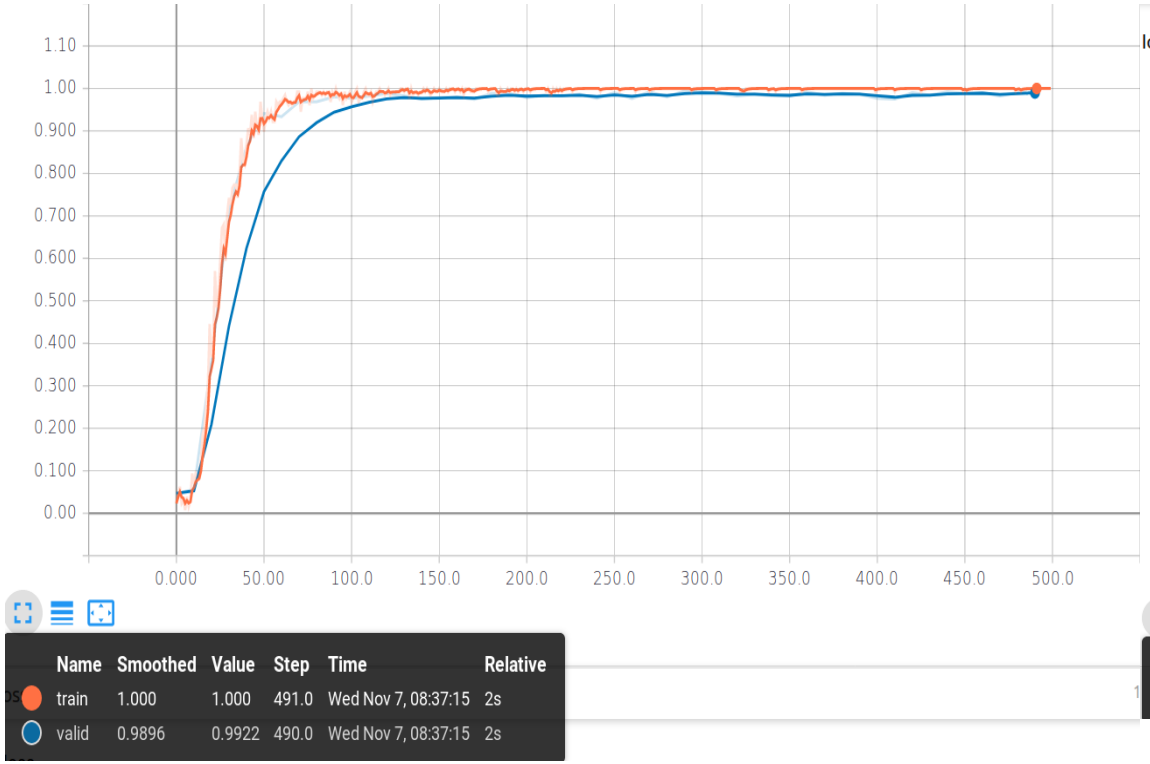


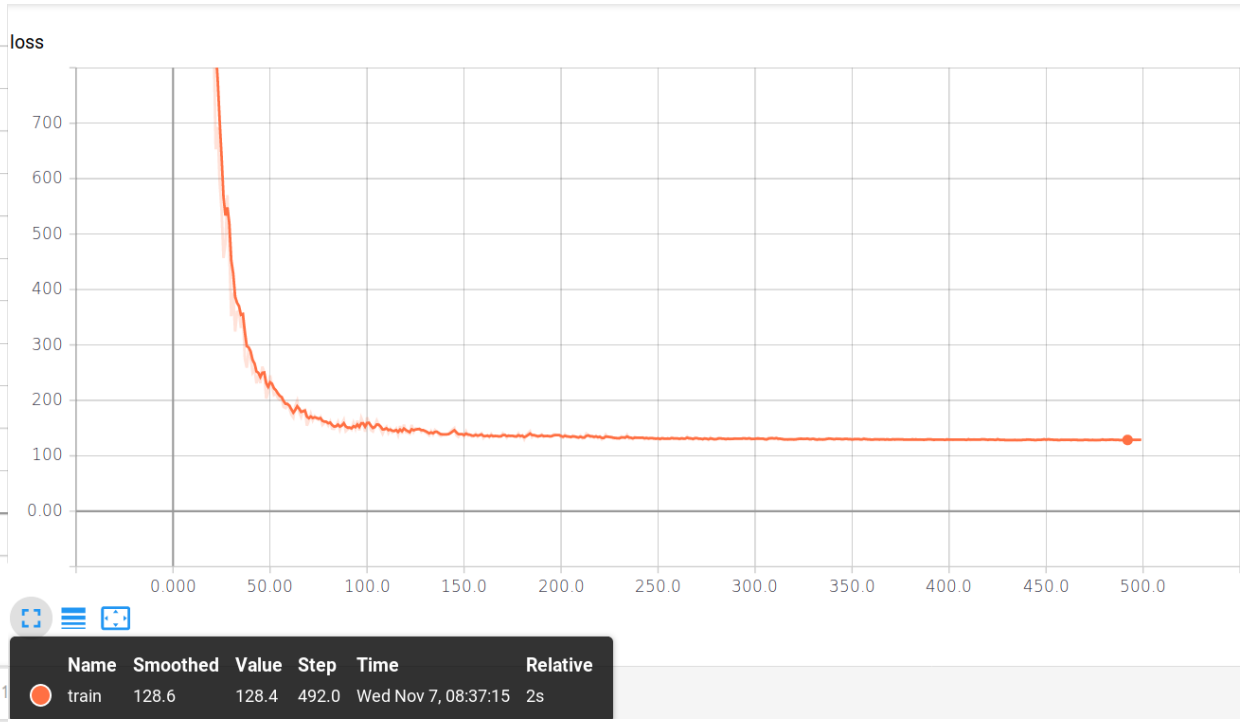
Visualization using PCA



Visualization using t-SNE

Experimental results





Experimental results

TABLE III. ACCURACIES AMONG DATASETS

Dataset	Training	Validating	Testing (1) (Closed set)	Testing (1+2) (Open set)
#images	1560	520	1040	5109
#identities	52	52	52	4121
Accuracy	100%	99.36%	98.85%	96.48%

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.