

Human identification in video using 3D facial features

3D Face recognition



Nguyen Trong Van - Le Quang Vu
Student of Computer Science - HCMUS
Bachelor degree

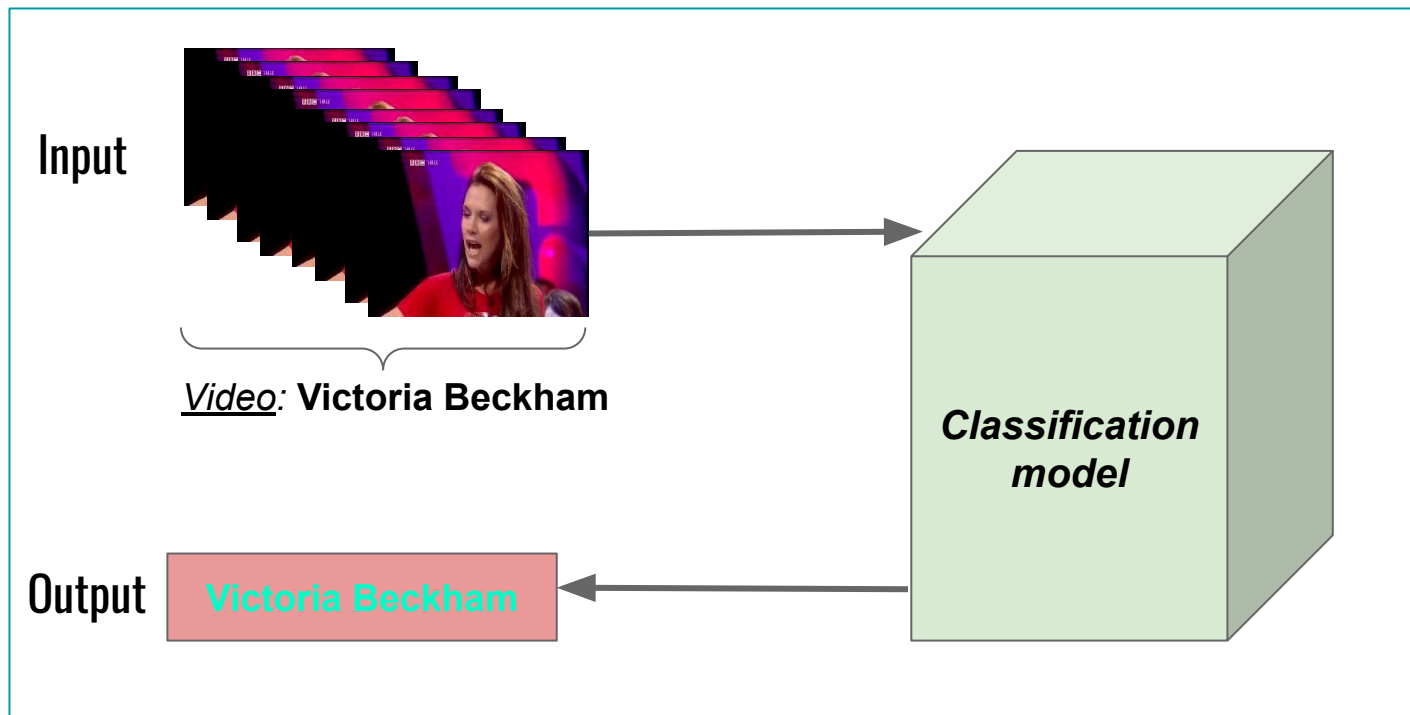
MAIN CONTENT

1. Problem Description
2. Implementation Process
3. Experiment result
4. Future works

Problem Description

- Task
- Input, output

1. Problem Description

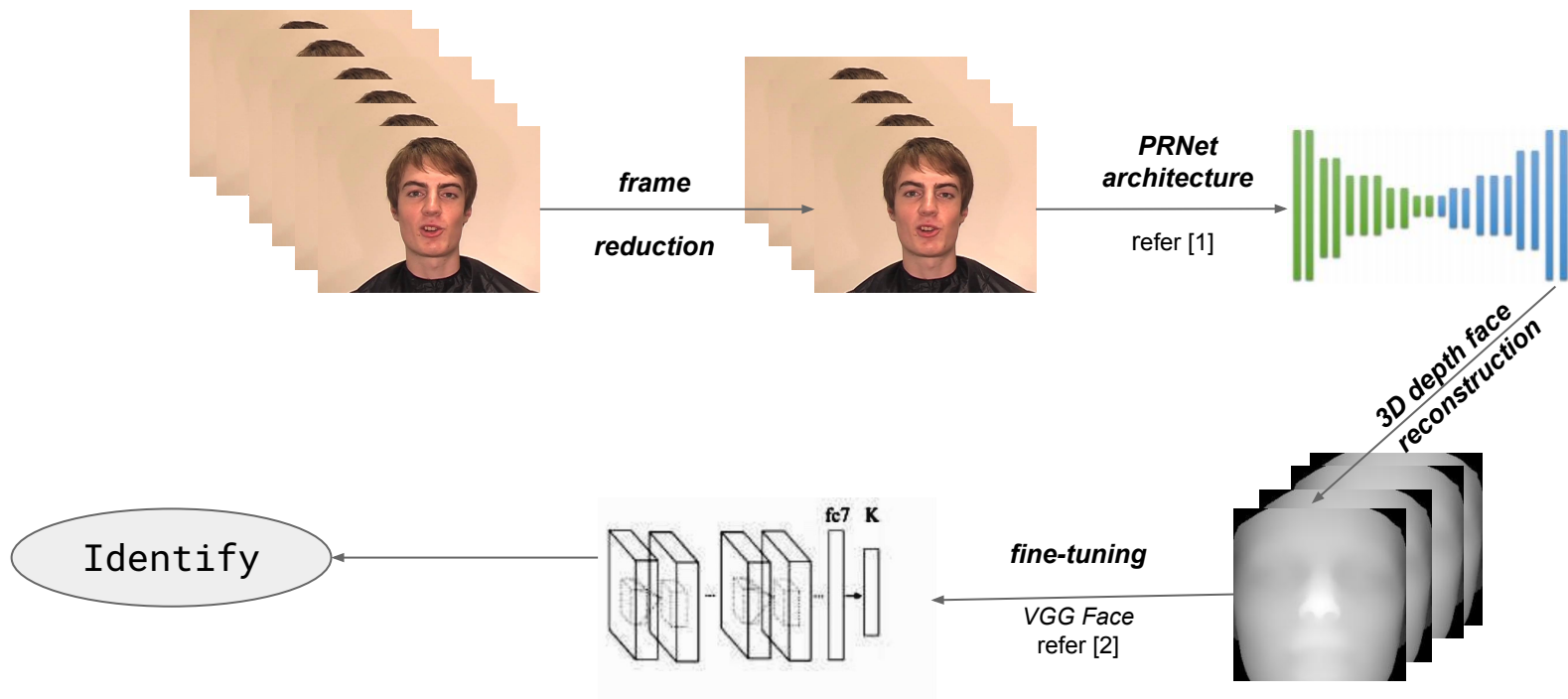


Human video classification task

Implementation Process

- Method
- 3D face reconstruction model
- 3D face feature for recognition
- Classification model
- Identification method

2. Implementation Process

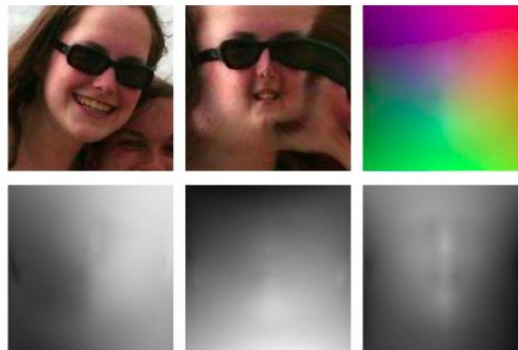
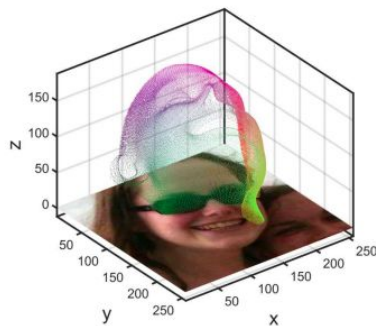


[1] Feng, Yao et al. "Joint 3D Face Reconstruction and Dense Alignment with Position Map Regression Network" - ECCV 2018

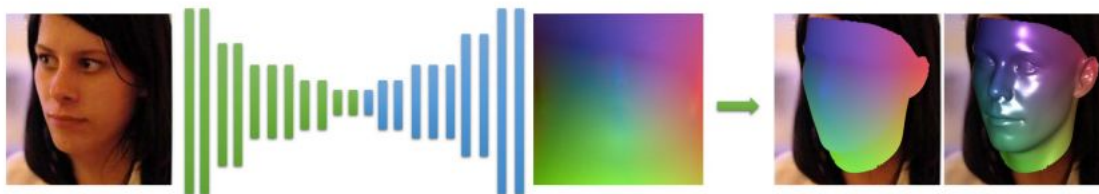
[2] Kim, Donghyun et al. "Deep 3D Face Identification". In: IEEE IJCB - 2017

Position Regression Network

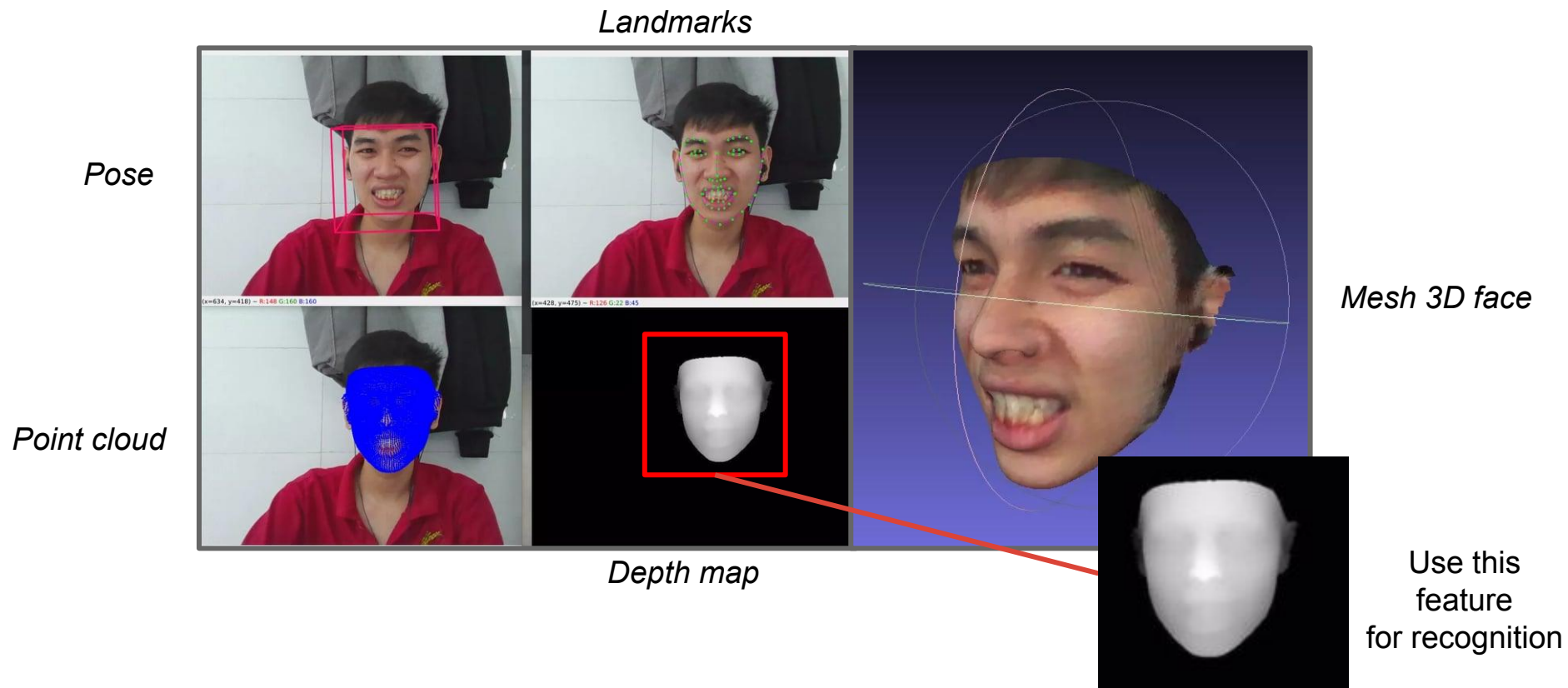
- 3D face representation - UV position map



- Position Map Regression Network - PRNet [1]: Directly regression UV map from only 2D face image



Output of PRNet

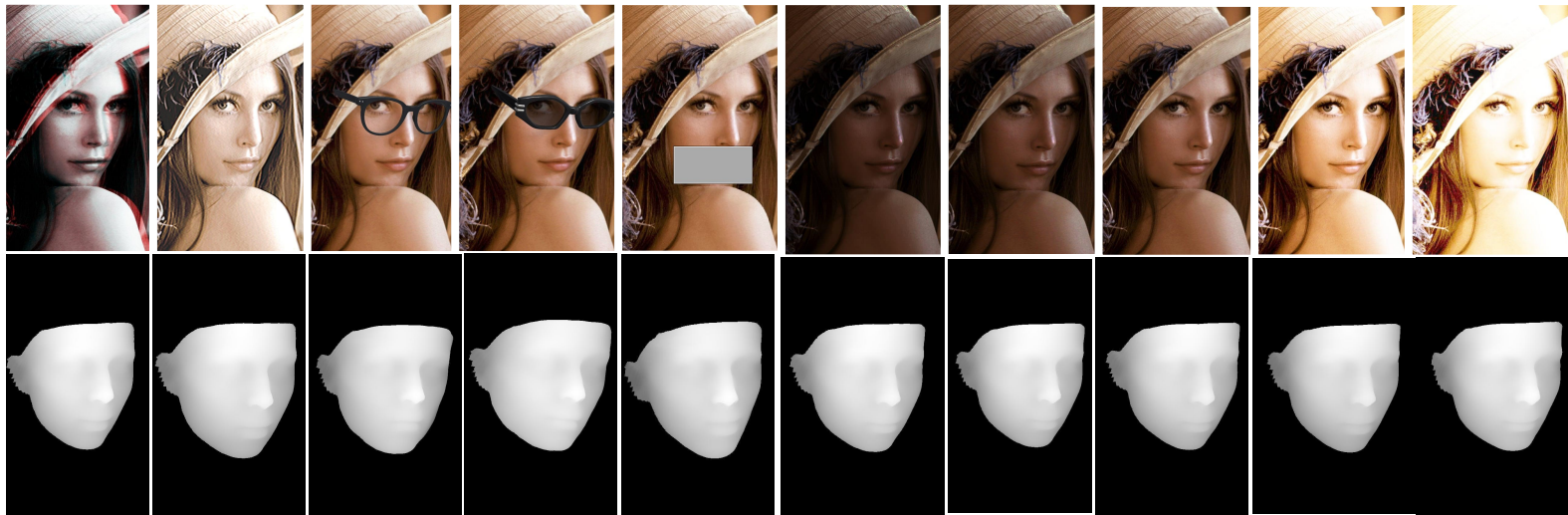


3D facial depth map



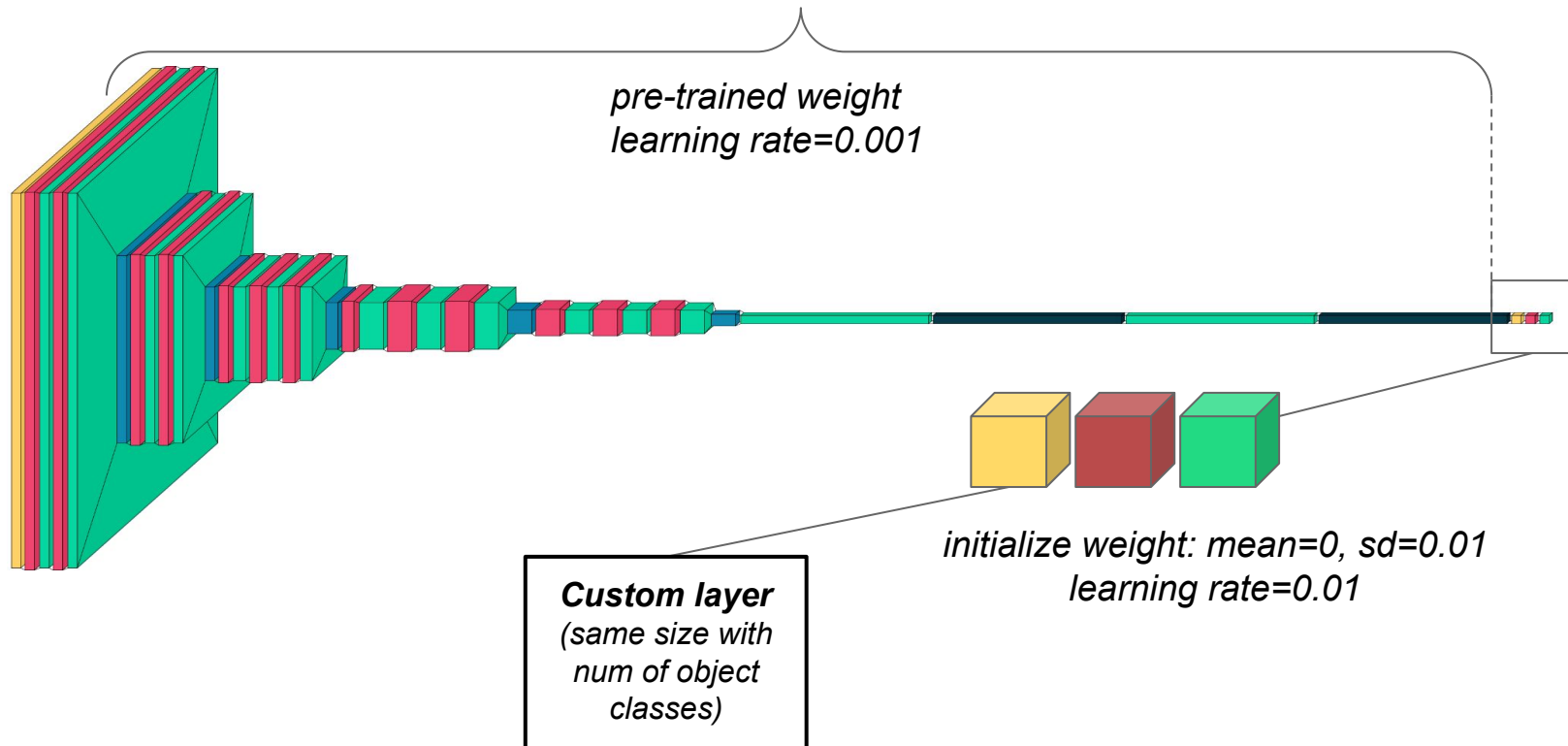
Noise, occlusion

Brightness



Classification architecture

VGG Face



Identify method

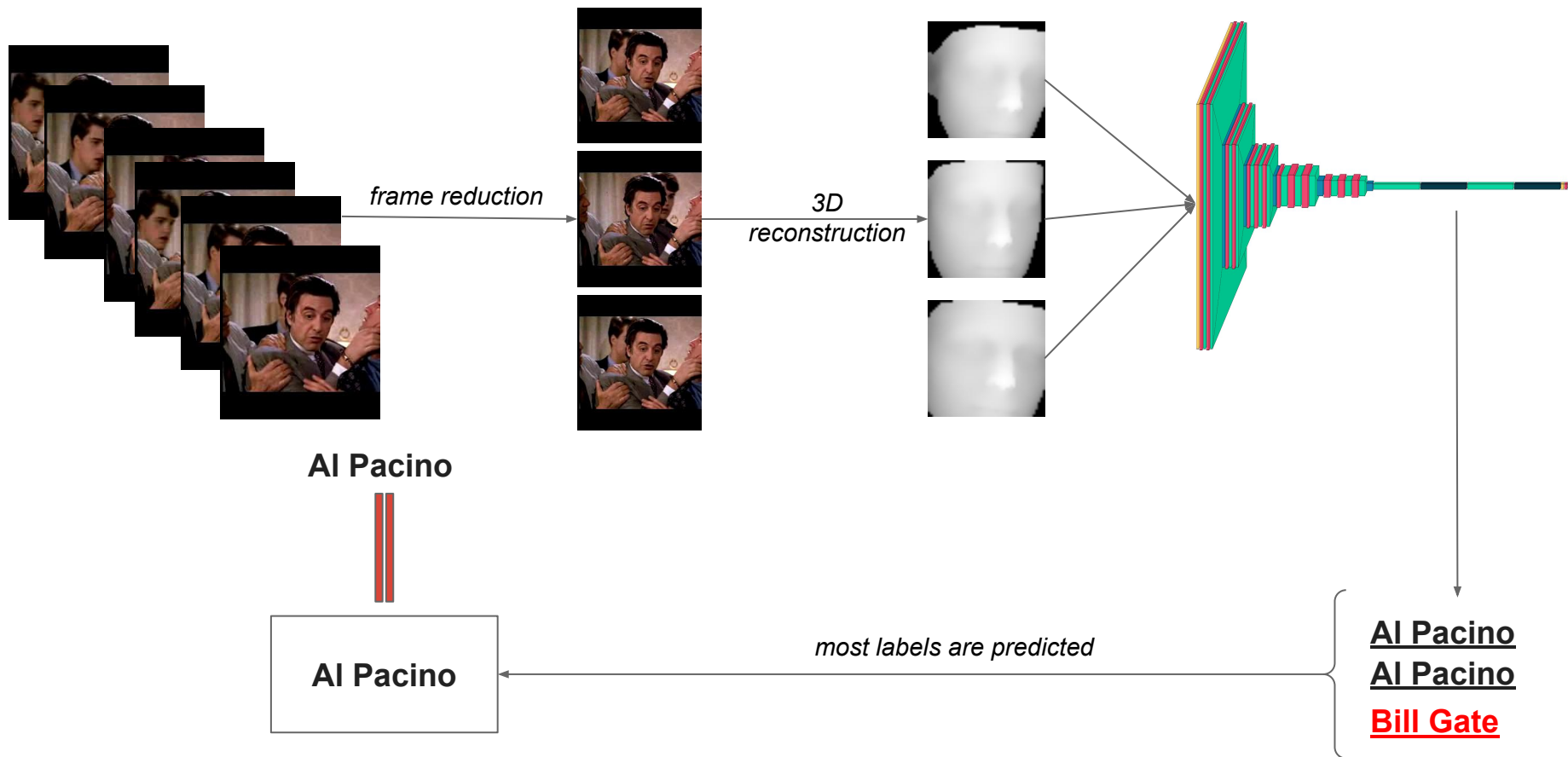
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graph LR; A[Identify method] --> B[Feature vector matching]; A --> C[Softmax classification];
```

Feature vector matching

(refer [2])

Softmax classification

Softmax Classification



Experiment Result

- Training environment
- Dataset
- Accuray
- Analysis

3. Experiment result

Environment



training on



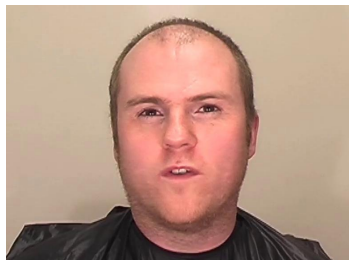
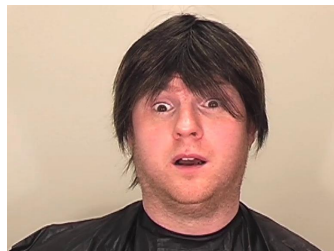
- *Loss function:* Cross Entropy.
- *Metric:* Accuracy.

Evaluation method

Training 80% - Testing 20%

DATASET

- FAMED

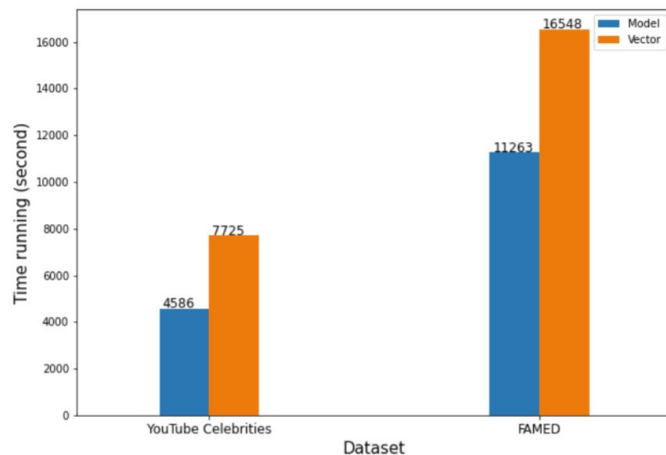


- YouTube Celebrities



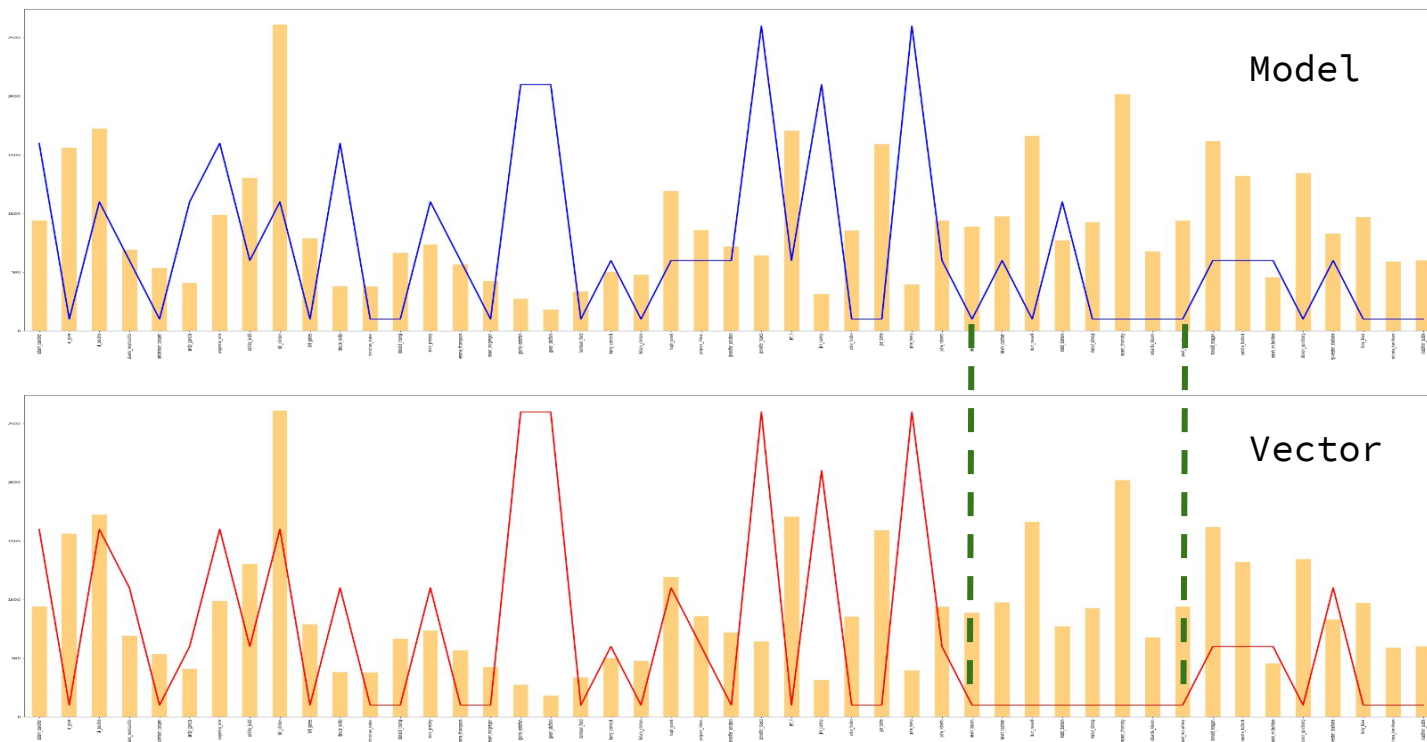
Accuracy on test set

<i>Method</i>	<i>YouTube Celebrities</i>	<i>FAMED</i>
<i>Feature vector matching</i>	85.16	97.18
<i>Softmax classification</i>	84.89	97.40



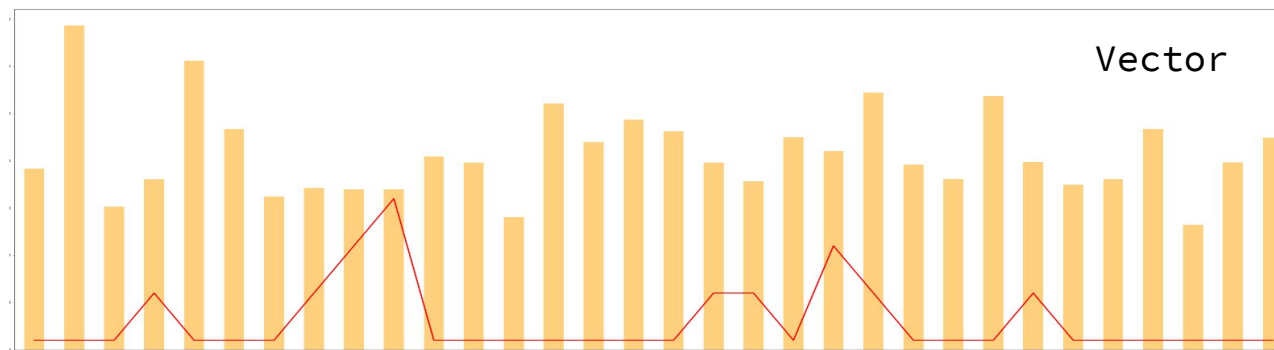
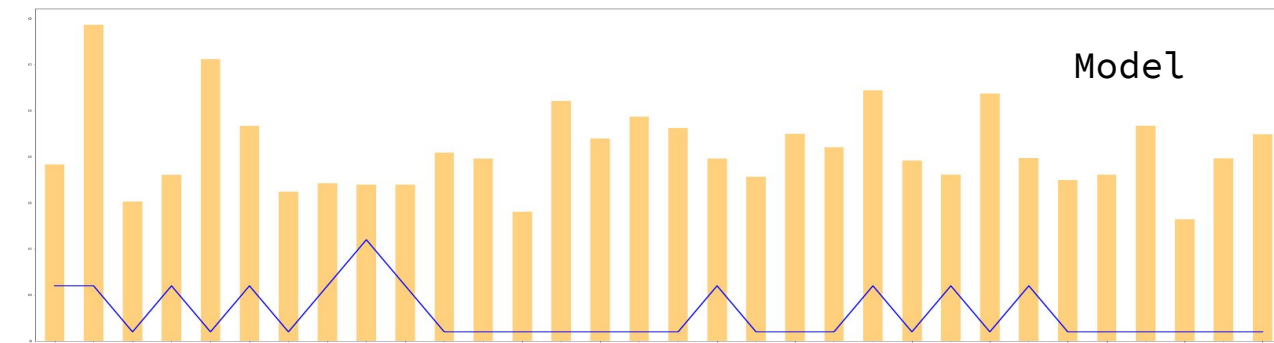
Time running on test set with 2 identification methods

Error ratio with dataset' s distribution



YouTube Celebrities dataset

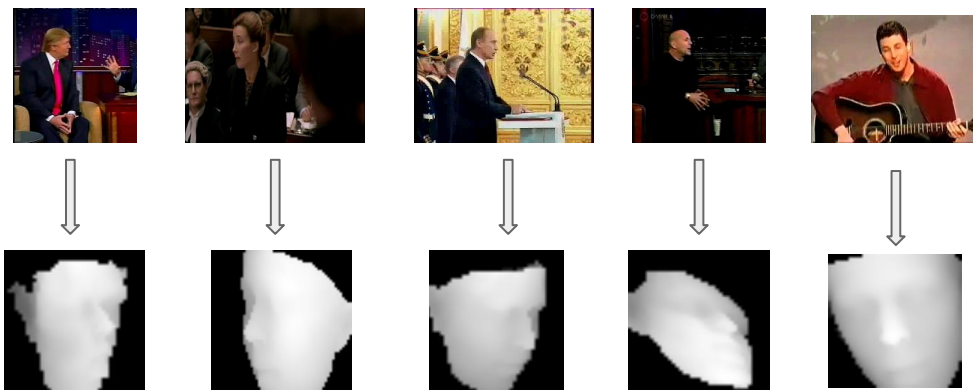
Error ratio with dataset' s distribution



FAMED dataset

Fail case in dataset

- Fail reconstruction: low resolution, small face, facial pose



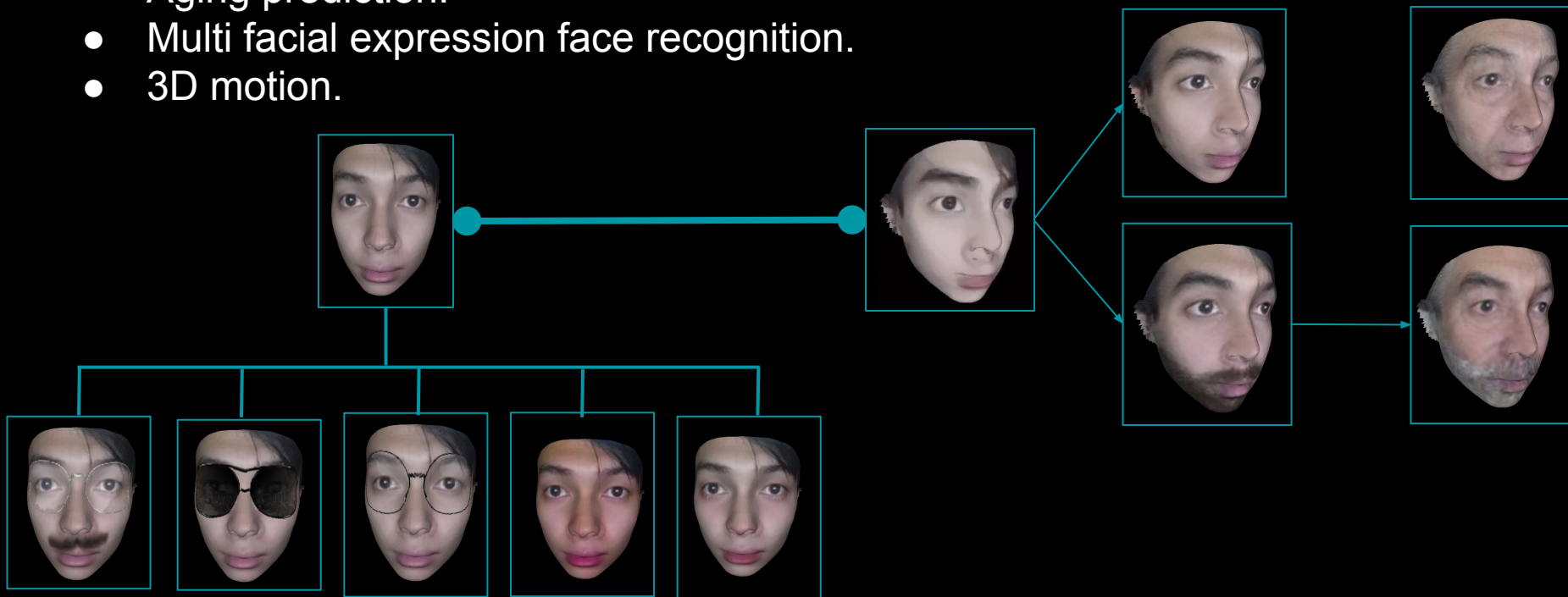
- Cannot detect face on video: low resolution, facial pose, textures,..



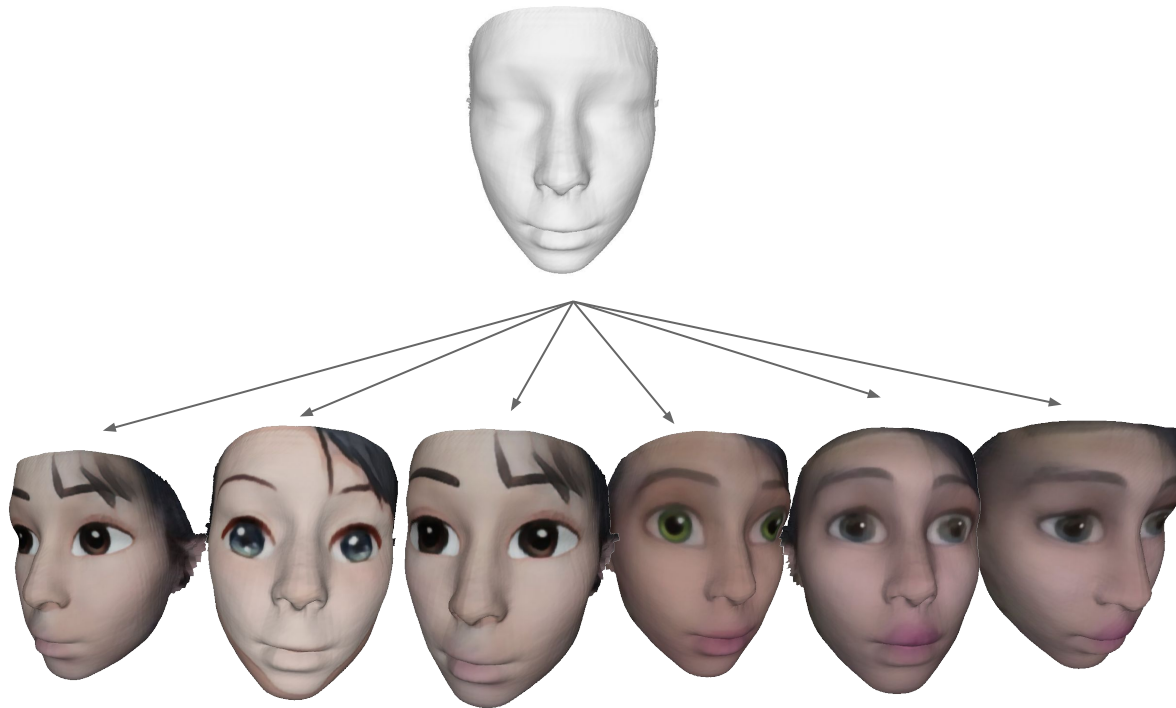
Future Works

4. Future works

- 3D object description.
- Aging prediction.
- Multi facial expression face recognition.
- 3D motion.



- 3D object description.
- 3D character generation from base mesh.



REFERENCES

- [1] Feng, Yao et al. “*Joint 3D Face Reconstruction and Dense Alignment with Position Map Regression Network*” - ECCV 2018
- [2] Kim, Donghyun et al. “*Deep 3D Face Identification*”. In: IEEE IJCB - 2017
- [3] Truong, Khoa Tan and Le, Thai Hoang. “*Video-based face recognition using shape and texture information in 3D Morphable Model*”. In: JP Journal of Heat and Mass Transfer 15 (2018)