

Facial Dynamics for Identity and Expression Recognition

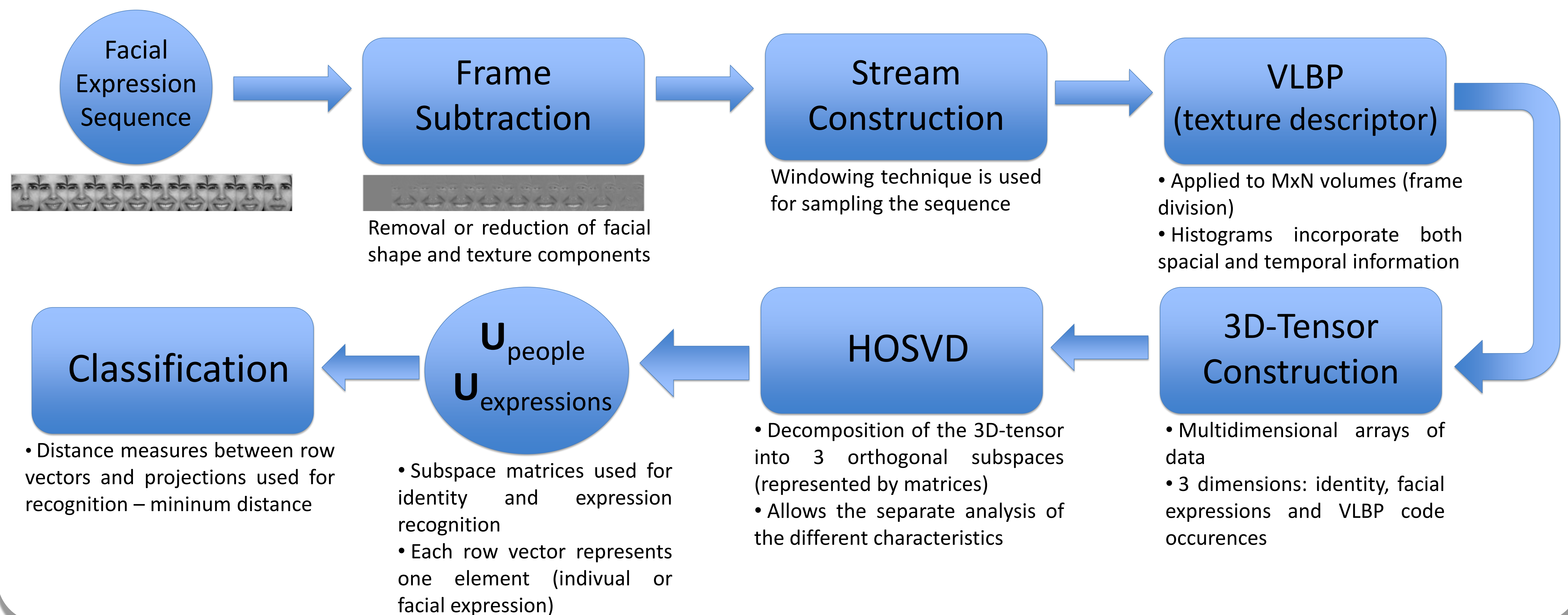
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Main objective: Demonstrate that facial dynamics is a biometric

Motivation

- Advantage over static analysis: facial dynamics is less affected by physical changes such as ageing, gaining weight, wearing glasses or growing a beard
- Research shows that dynamic information may be beneficial for age, gender and identity recognition
- There are many applications for identity and expression recognition : access control, surveillance, in psychology or psychiatry

Methodology



Experimental Results

Database 1

- 4 people
- 6 basic expressions with 4 repetitions

No. of Blocks	Subtracted DB		Original DB	
	Identity Recog.	Expression Recog.	Identity Recog.	Expression Recog.
1x1	76.04%	64.58%	89.58%	62.50%
3x2	91.67%	82.29%	100%	85.42%
5x4	98.96%	89.58%	100%	86.46%

- More blocks → histograms created using smaller parts of the faces → more detailed description → higher identity and expression recognition rates

Database 2

- 29 people
- 6 basic expressions without repetitions

Length	Step	% Identity Recog.	% Expression Recog.
25	22 (12%)	100 / 100	91.38 / 99.43
	25 (0%)	98.28 / 98.38	83.91 / 97.13
35	20 (43%)	100 / 99.43	99.43 / 98.85
	30 (14%)	98.85 / 98.85	88.51 / 94.25
45	15 (67%)	100 / 100	100 / 100
	24 (47%)	100 / 100	100 / 97.70

- Smaller steps → more overlapping between training and testing sequences → higher recognition rates

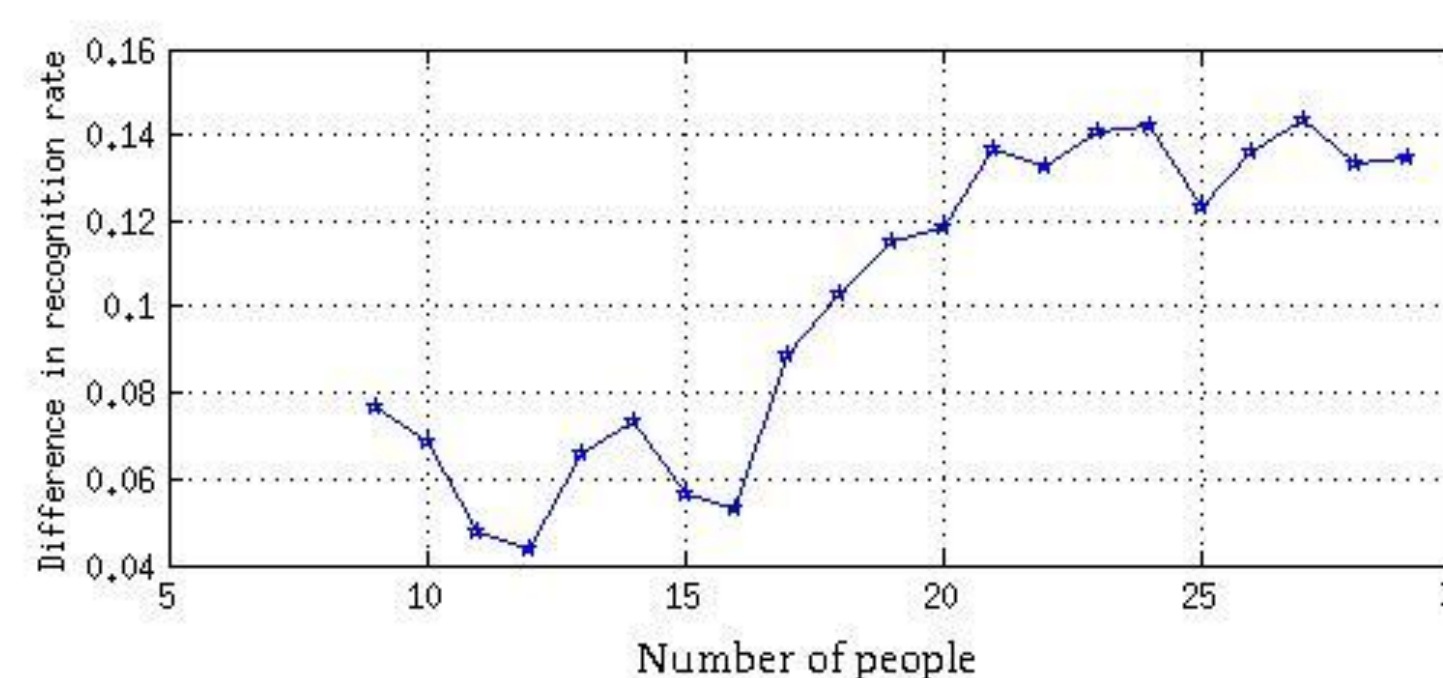
Databases 1 and 4

- 5 people (1 from Database 4)
- 6 basic expressions with 3 repetitions
- 2 repetitions with appearance changes



Face	Original DB	Subtracted DB
<i>Painted</i>	27.8%	81.1%
<i>With Foam</i>	0.00%	74.5%

- Average identity recognition rates obtained after varying stream lengths and step sizes
- Subtracted database → mostly dynamic information is present → significantly better recognition results



- More people → larger intersubject differences → worse recognition results with the original database (not so evident with the subtracted data set)

Conclusion

- Facial dynamics, in the form of facial expressions, can be used for performing identity recognition
- Using dynamic information alone is advantageous in the presence of a significant number of individuals
- The present method allows the identification of an individual who cannot be recognised using texture and shape information