

Facial expression classification In still images

Angel Gutiérrez, Montse Pardàs

Introduction

Face detection

Contour detection

Expression estimation

System implementation - DEA

Results

Conclusions



INTRODUCTION

- Basic expressions (Ekman i Friesen – 1971)



Joy

Anger

Neutral

Sad

Surprise

INTRODUCTION

Objective

- To develop an automatic system which can recognize a facial expression in a still image.

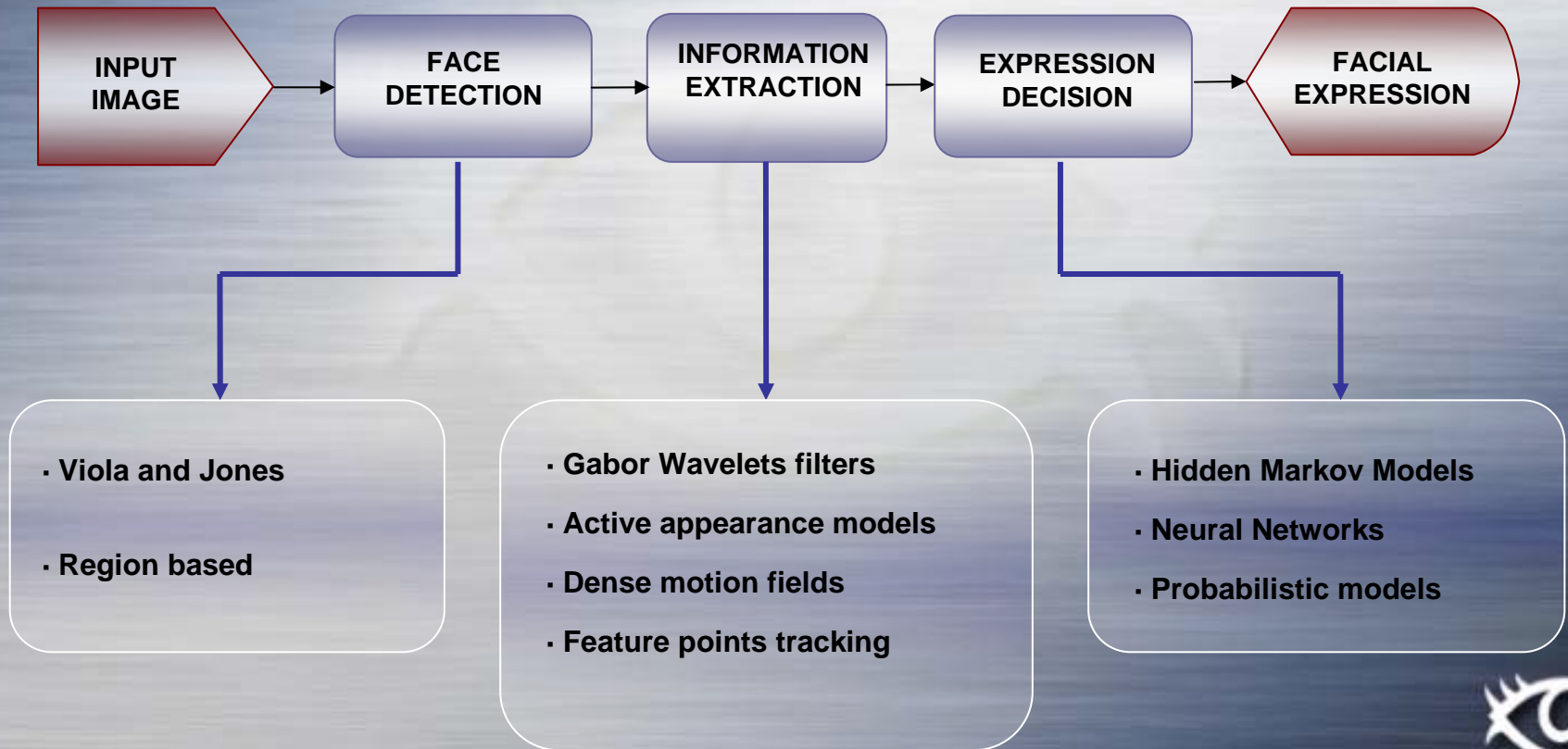
Applications

- Monitor for drivers
- Stress detection
- Facial coder
- Entertainment/ Games
- etc.



INTRODUCTION

Generic scheme. Methods.





FACE DETECTION

Viola and Jones:

- **Fast search**
- **Robust to background**

- **Uses local texture features**
- **Trains classifiers for face/non-face classes**
- **Uses a cascade of classifiers structure (Adaboost)**

Region-based:

- **Refines the face detection to obtain a better initialization**

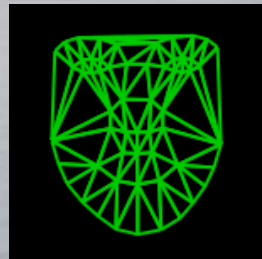
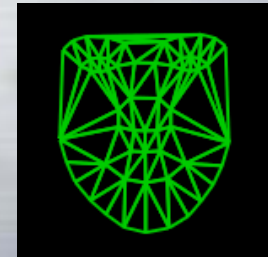


FACIAL FEATURE CONTOUR DETECTION

Model based method

Active Shape Models

Active Appearance Models

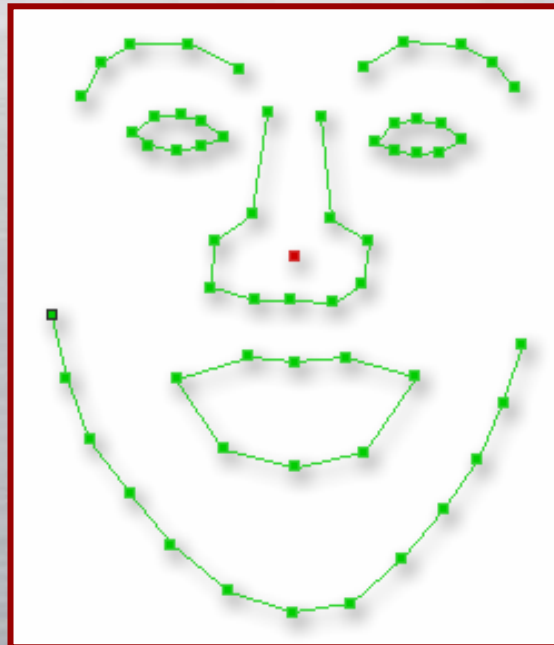


FACIAL FEATURE CONTOUR DETECTION

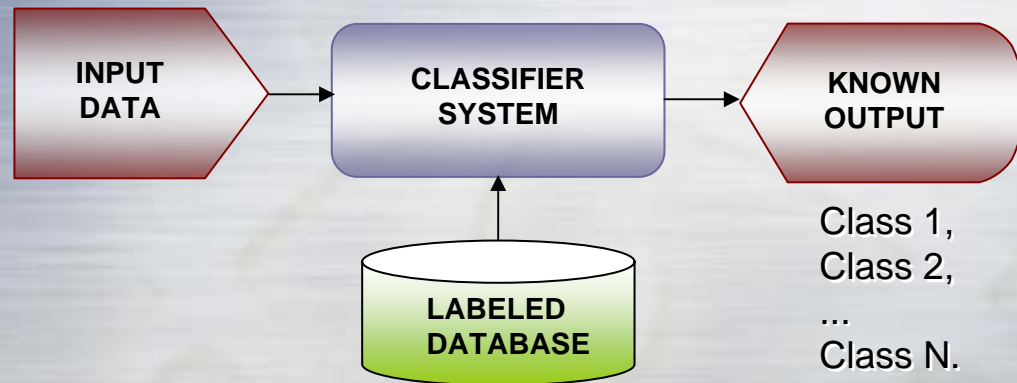
Based on Active Appearance Model software implemented by Stegmann*

* M. B. Stegmann, B. K. Ersbøll, R. Larsen, FAME - A Flexible Appearance Modelling Environment, IEEE Transactions on Medical Imaging, vol. 22(10), pp. 1319-1331, Institute of Electrical and Electronics Engineers (IEEE), 2003

- Facial feature contours are represented by a 58 points model



FACIAL EXPRESSION



Bayesian framework with probabilistic model: Mixture of multivariate gaussians, trained with EM for each class

RESULTS

Database

- 192 labeled images.



RESULTS

The screenshot shows a software interface for facial analysis. On the left, there is a vertical menu with three options: "Origen Imatge" (Image Source) with a folder icon, "Analitza!" (Analyze!) with a green play button, and "Configuració" (Configuration) with a checklist icon. The main area features a large photo of a smiling woman in a green shirt. To its right is a smaller image of the same woman with white facial landmarks overlaid. Above this smaller image is a blue button labeled "IMATGE VALIDA" (Valid Image). Below the main photo is a status bar with a yellow background. It contains the text "Informació:" (Information:), "FINALITZAT" (Completed), a blue progress bar, a small cartoon man icon, "100 % ALEGRIA" (100% Happiness), and "Temps: 3 seg." (Time: 3 seconds). In the bottom right corner of the interface is a stylized eye logo with the text "D-E-A" below it.



RESULTS

TEST 1



95,47%	H	A	N	Su	Sa
H	96%			4%	
A		98%			2%
N			94%	6%	
Su	4%		3%	93%	
Sa			3%		97%



95,47 %



D-E-A

RESULTS

TEST 2



84,66%	H	A	N	Su	Sa
H	96%		2%	2%	
A	6%	79%	4%	4%	8%
N		3%	69%	13%	16%
Su			4%	96%	
Sa		3%	14%		83%



84,66 %



CONCLUSIONS

- Automatic system for facial expression detection in 3 stages:



- Correct classification rate **85 %**, with **5 classes**.
- Only frontal faces.
Problems with facial hair and sometimes with glasses

