# Multimodal Information Analysis for Emotion Recognition

(Tele Health Care Application)

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# Our Goal

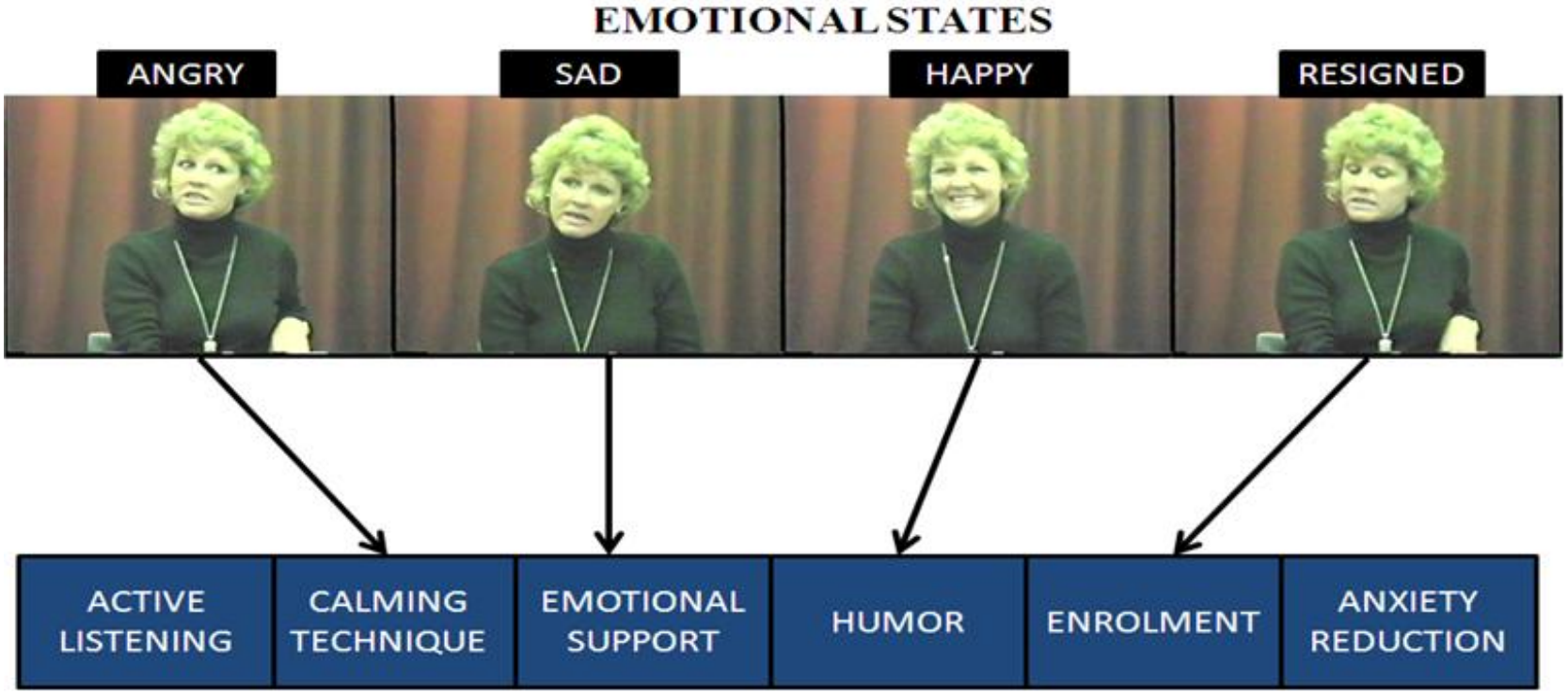
- Automatic emotion recognition using audio-visual information analysis.
- Create video summaries by automatically labeling the emotions in a video sequence.

# Applications of Automatic Emotion Recognition

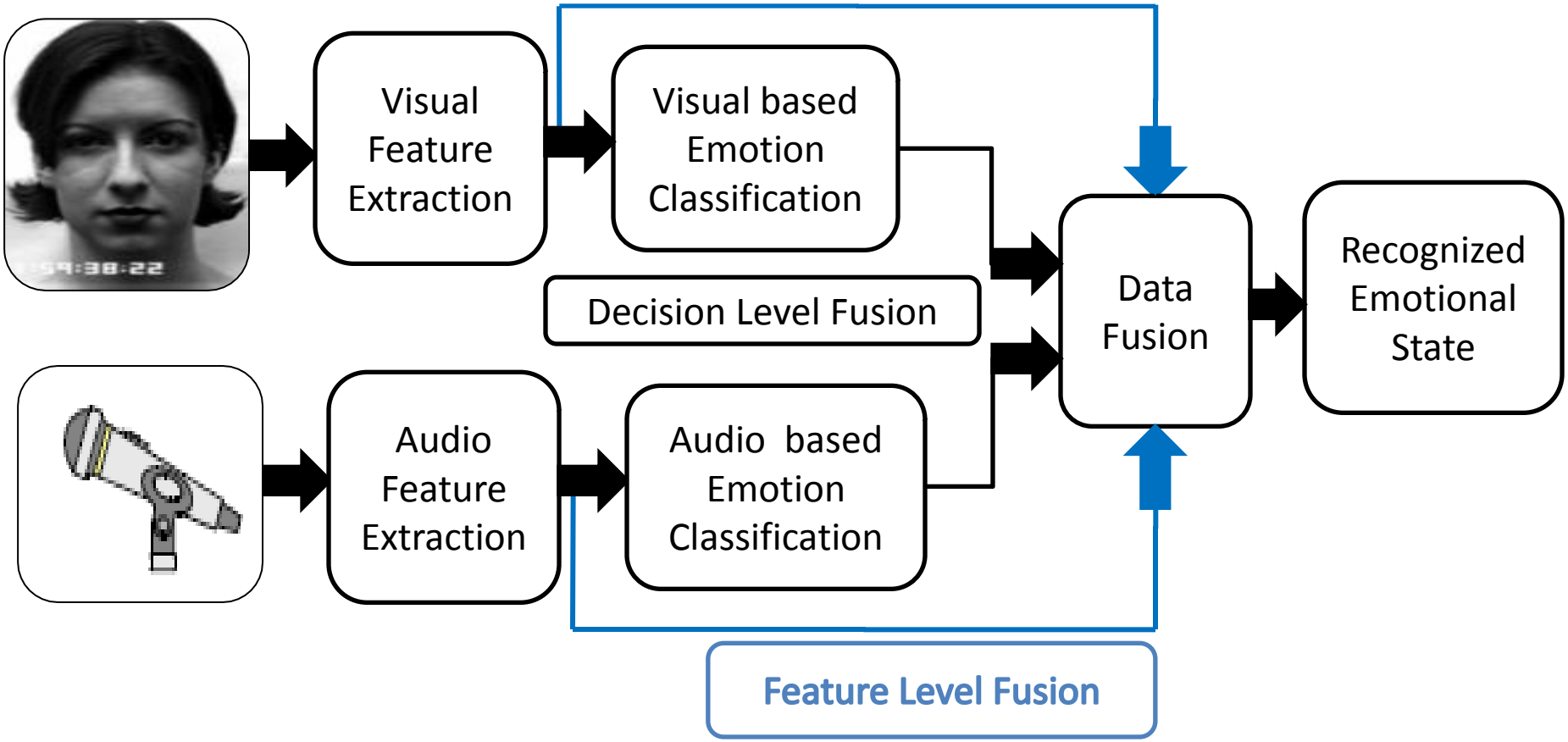
- Lie Detection
- Gaming
- E-Learning
- Automobile Driver Alertness
- Video Indexing and Summarization
- Tele-Health Care

# Motivation

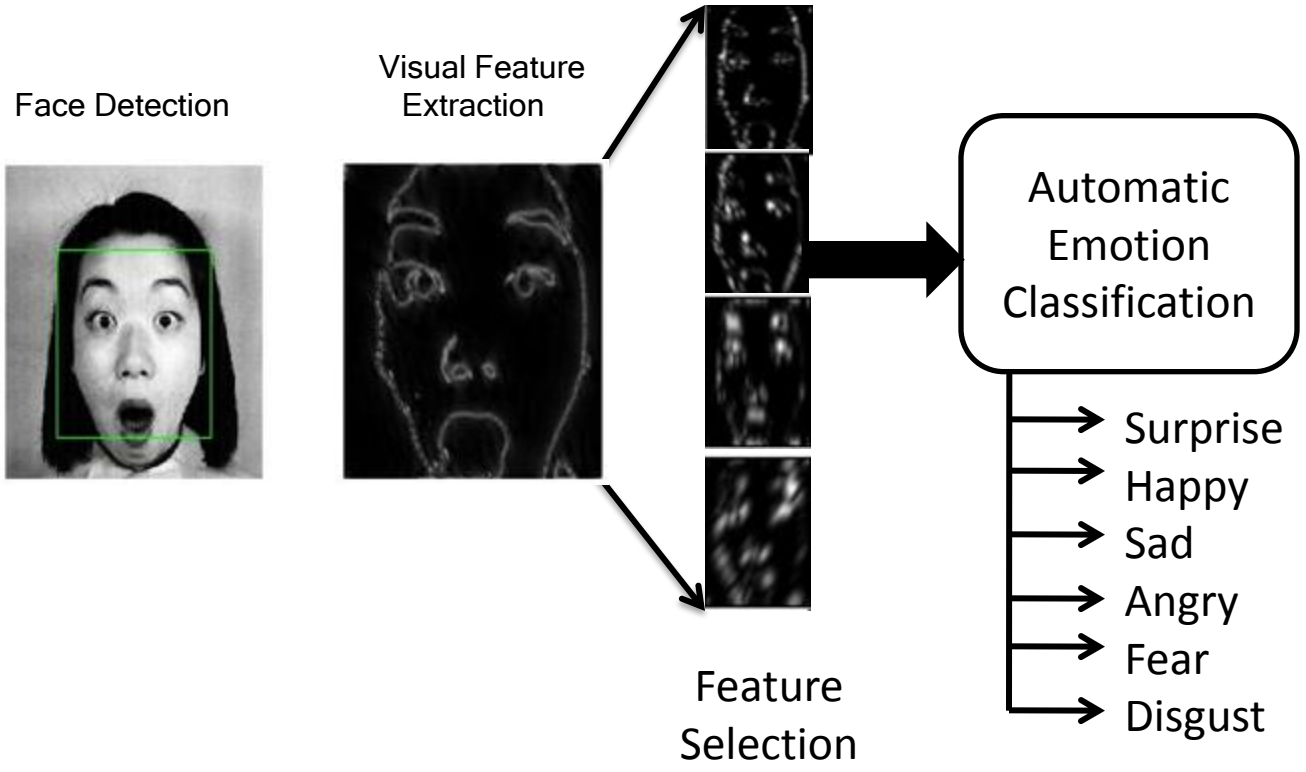
- Map Emotional States of the Patient to Nursing Interventions.
- Evaluate the role of Nursing Interventions for improvement in patient's health.



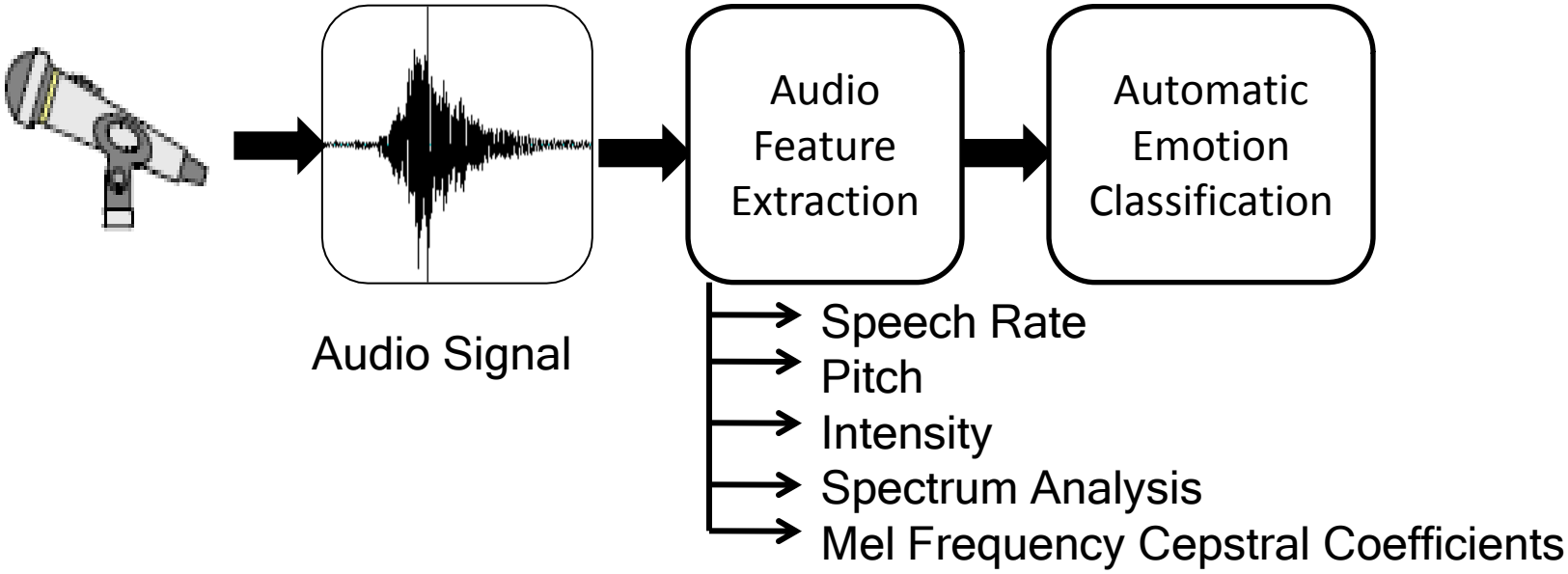
# Proposed Approach



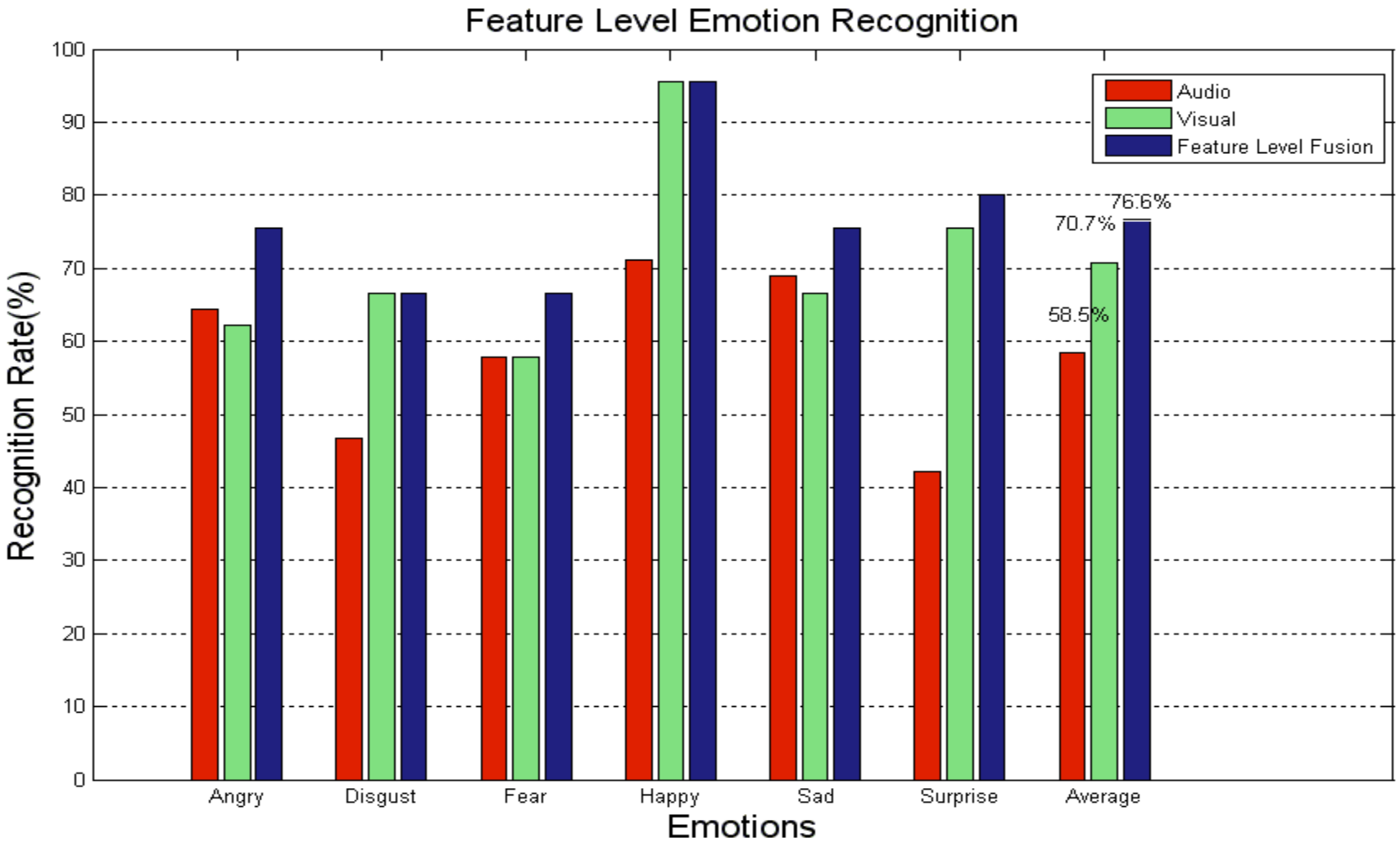
# Visual Analysis



# Audio Analysis

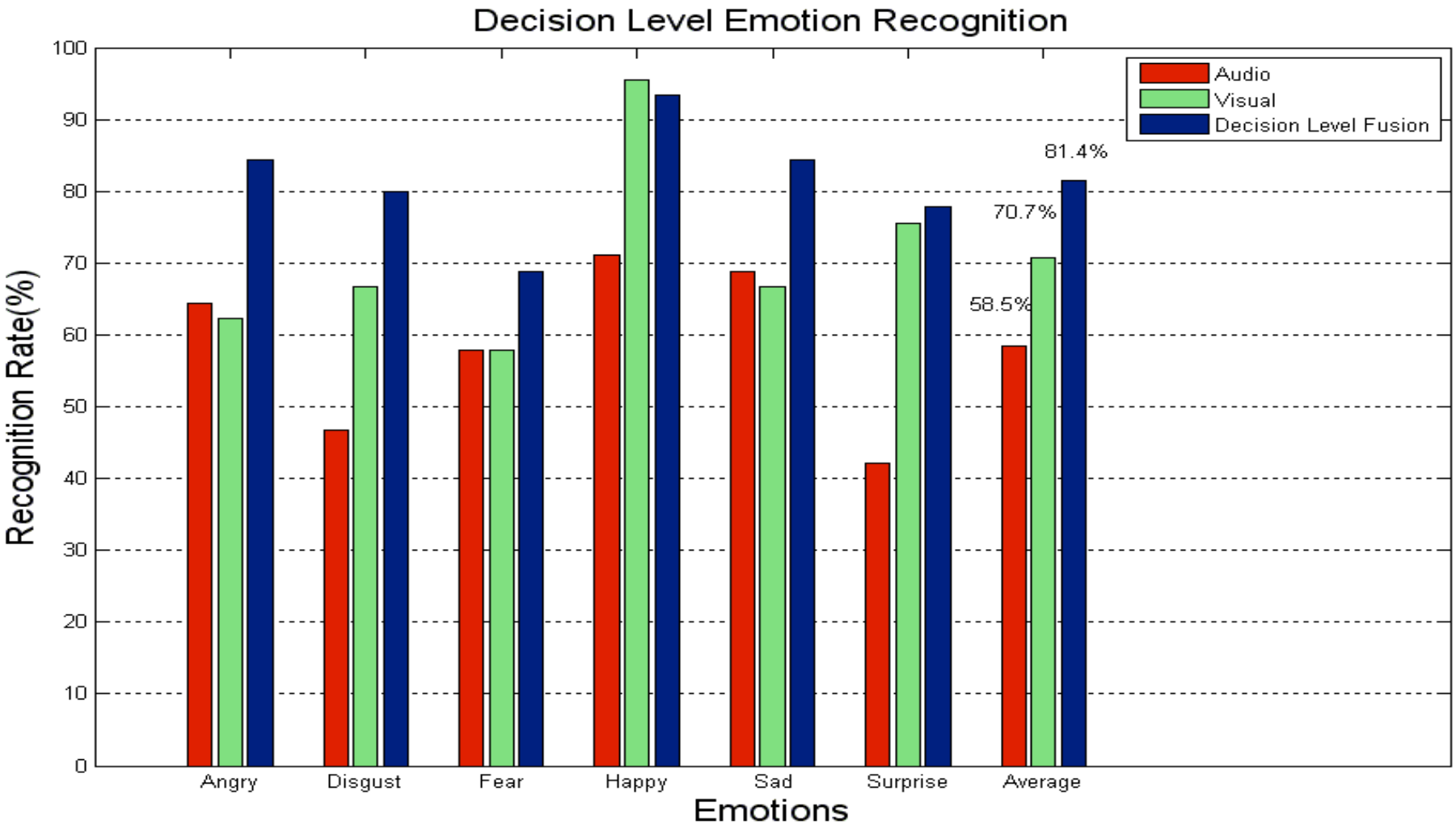


# Results - Feature Level Fusion




(*eNTERFACE 2005 , Posed Audio Visual Database)

# Results - Decision Level Fusion

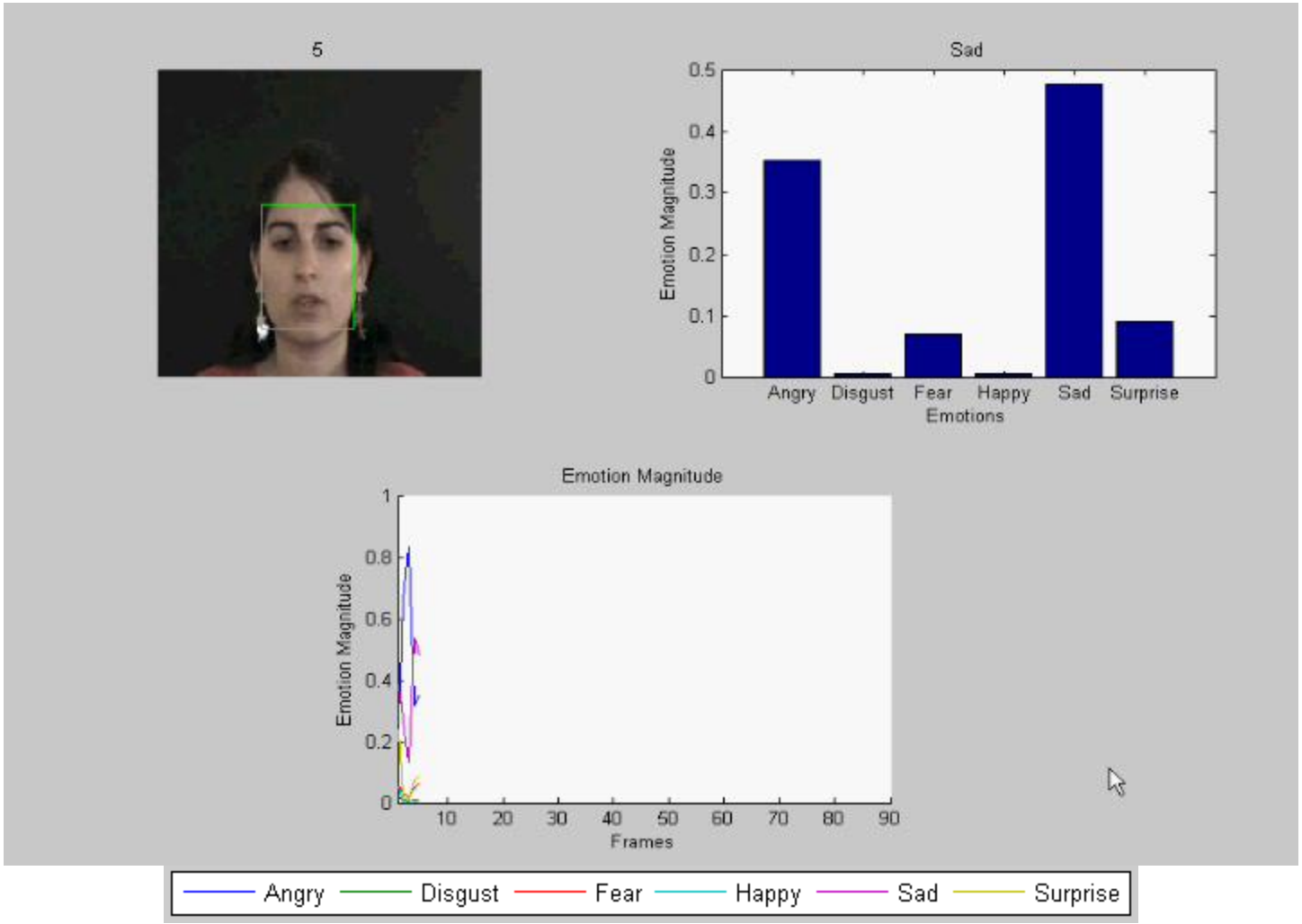



(*eNTERFACE 2005 , Posed Audio Visual Database)

# Conclusion

- Combining two modalities (Audio and Visual) improves overall recognition rates by 11% with Decision Level Fusion and by 6% with Feature Level Fusion
- Emotions where vision wins: Disgust, Happy and Surprise.
- Emotions where audio wins: Anger and Sadness
- Fear was equally well recognized by the two modalities.
- Automated multimodal emotion recognition is clearly effective.

# Demo


5
Sad
Emotion Magnitude
0.5
0.4
0.3
0.2
0.1
0
Angry
Disgust
Fear
Happy
Sad
Surprise
Emotions
Emotion Magnitude
Emotion Magnitude
1
0.8
0.6
0.4
0.2
0
10
20
30
40
50
60
70
80
90
Frames
Angry
Disgust
Fear
Happy
Sad
Surprise

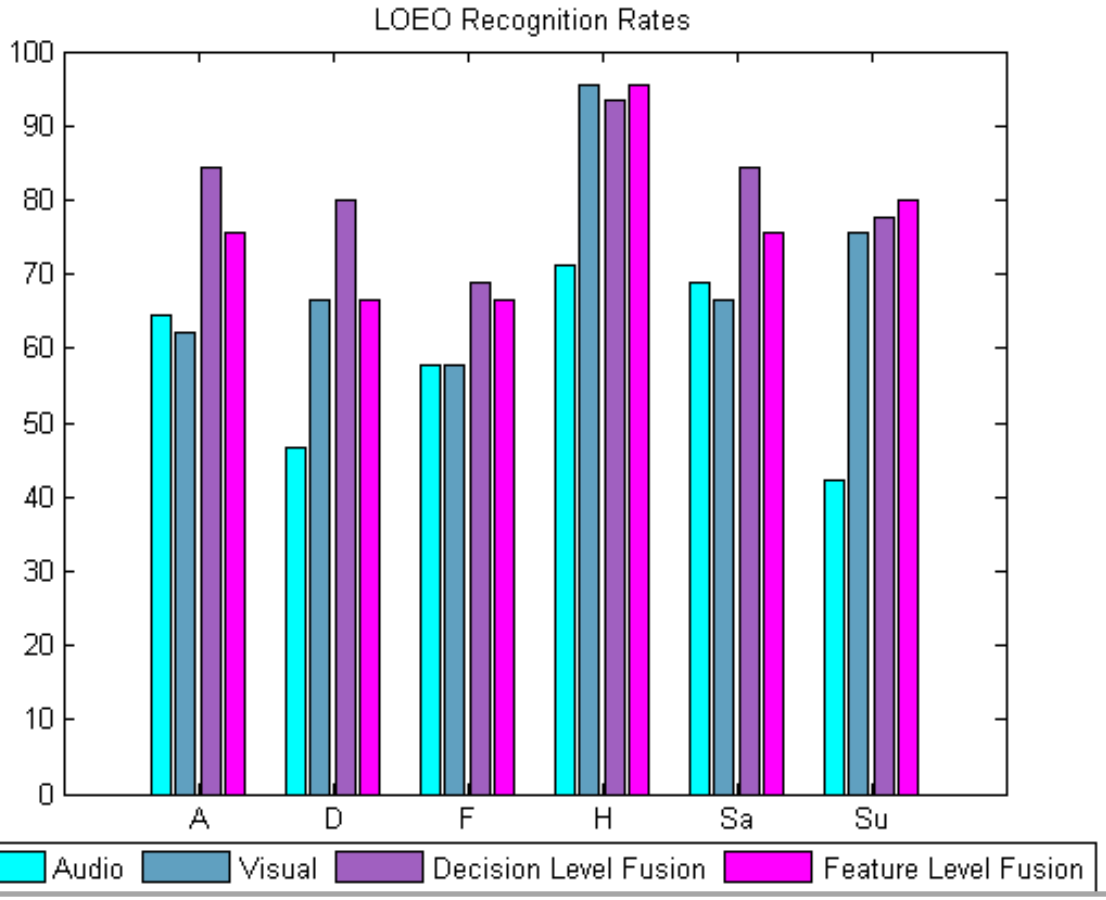
# Questions???

# Experimental Database

- 9 Subjects.
- 6 Posed Emotions: Anger, Disgust, Fear, Happiness, Sadness and Surprised.
- All videos are tested using leave one video sequence out cross validation.

http://www.enterface.net/enterface05/

# Combined Recognition Results




| | | | | |
|---|---|---|---|---|
| Average: | 58% | 70.74% | 81.48% | 76.66% |

(eNTERFACE 2005 , Posed Audio Visual Database)

# Audio Features for Emotion Recognition

| | Anger | Happiness | Sadness | Fear | Disgust |
|---|---|---|---|---|---|
| Speech Rate | slightly faster | faster or slower | slightly slower | much faster | very much slower |
| Pitch Average | very much higher | much higher | slightly lower | very much higher | very much lower |
| Pitch Range | much wider | much wider | slightly narrower | much wider | slightly wider |
| Intensity | higher | higher | lower | normal | lower |