What makes a smile ?

A Deep Neural Network Point of View

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Introduction

- Self-driving Car
- Self-driving Drone
- Economy
- Military
- . . .

Affective Computing

"If we want computers to be genuinely intelligent and to interact naturally with us, we must give computers the ability to recognize, understand, even to have and express emotions."

- Picard

Affective Computing

- Emotion Recognition
- EEG
- ECG
- Facial Expression
- Intonation

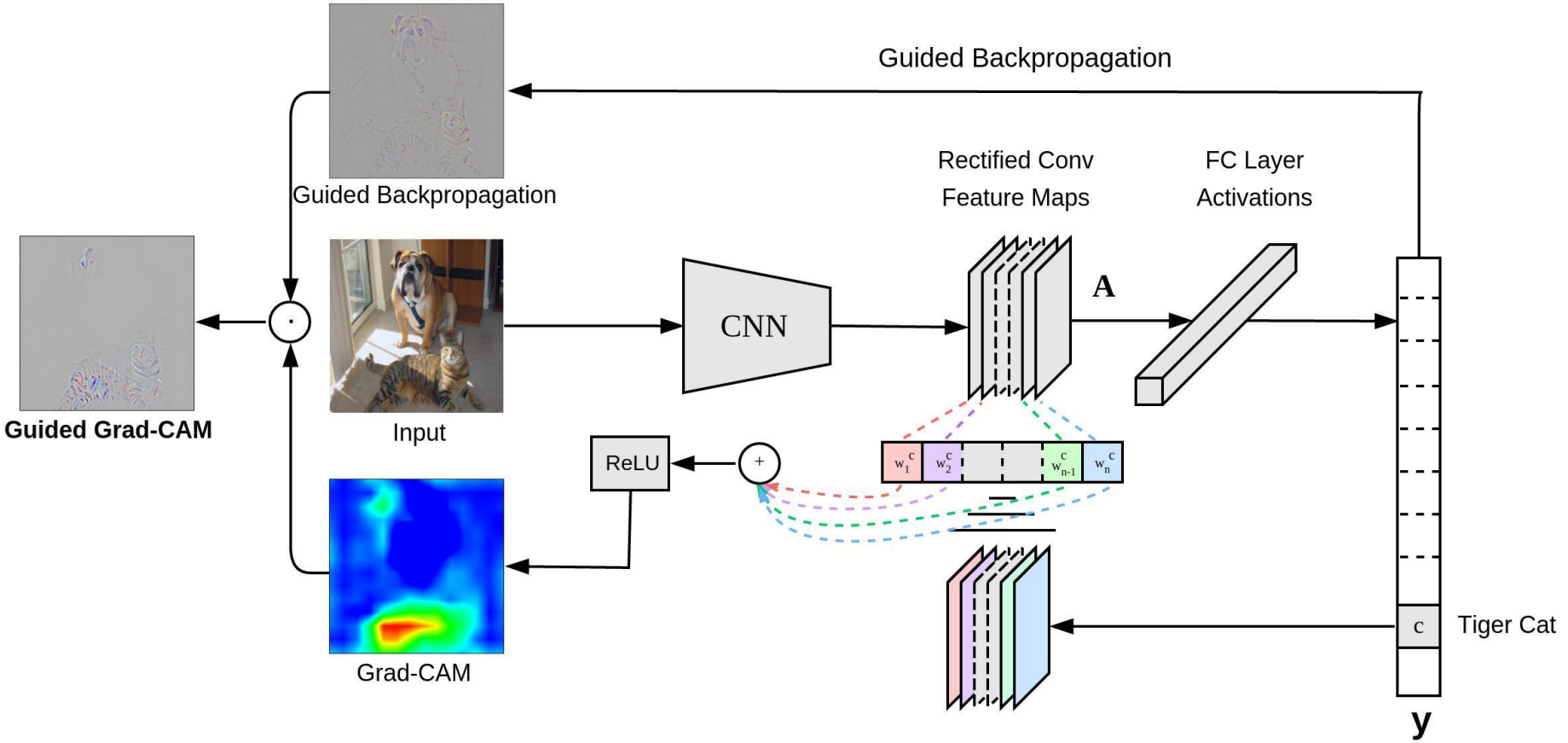
Explainability in Affective Computing

- Understanding the model's prediction
- Identify the important part of our input
- Which part of the input contributes to the emotion prediction

Chicago Face Dataset

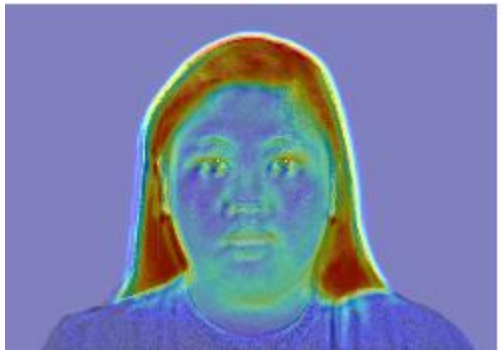
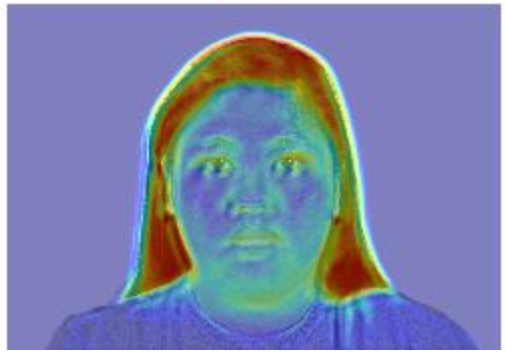
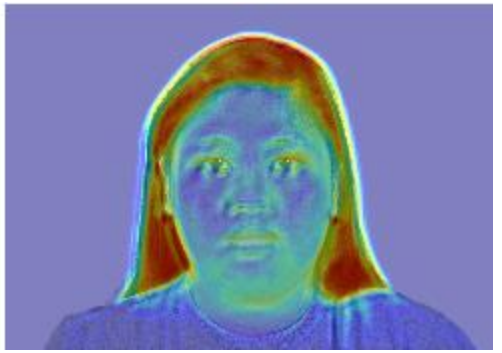
- Each face have one expression among: neutral, angry, fearful, happy with mouth closed, happy with mouth opened.

GradCam


Guided Backpropagation
Guided Backpropagation
Rectified Conv
Feature Maps
FC Layer
Activations
A
CNN
Guided Grad-CAM
Input
ReLU
Grad-CAM
c
Tiger Cat
y

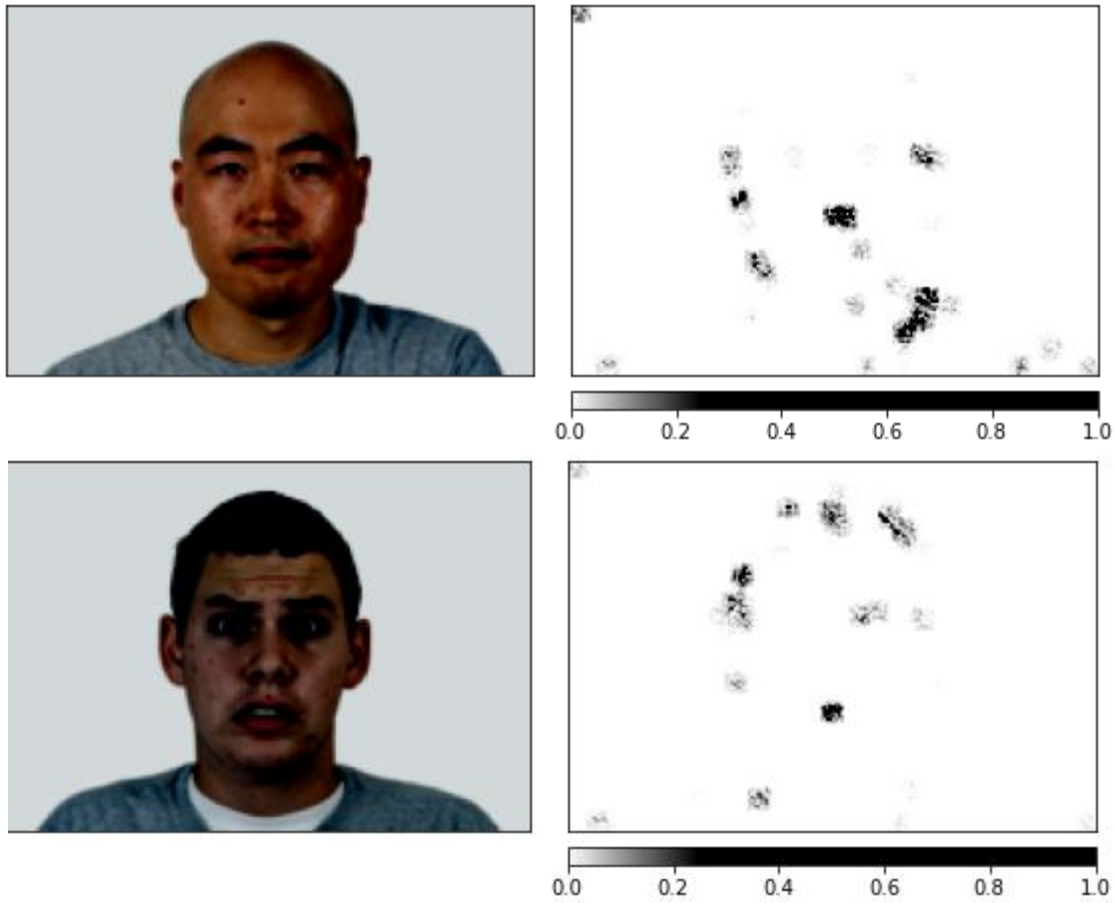
GradCam

The heat-map displays the hair as being the highest importance for the network, with the facial features coming after in intensity.

Gradient SHAP

The pixels that were crucial in recognizing the emotion are located on the face, but also in the hair area and outside the face.



Conclusion

- CNN identify patterns that are not important
- Important to choose the right dataset, transform it to avoid bias in data

Question(s)?