

Facial Emotion Recognition

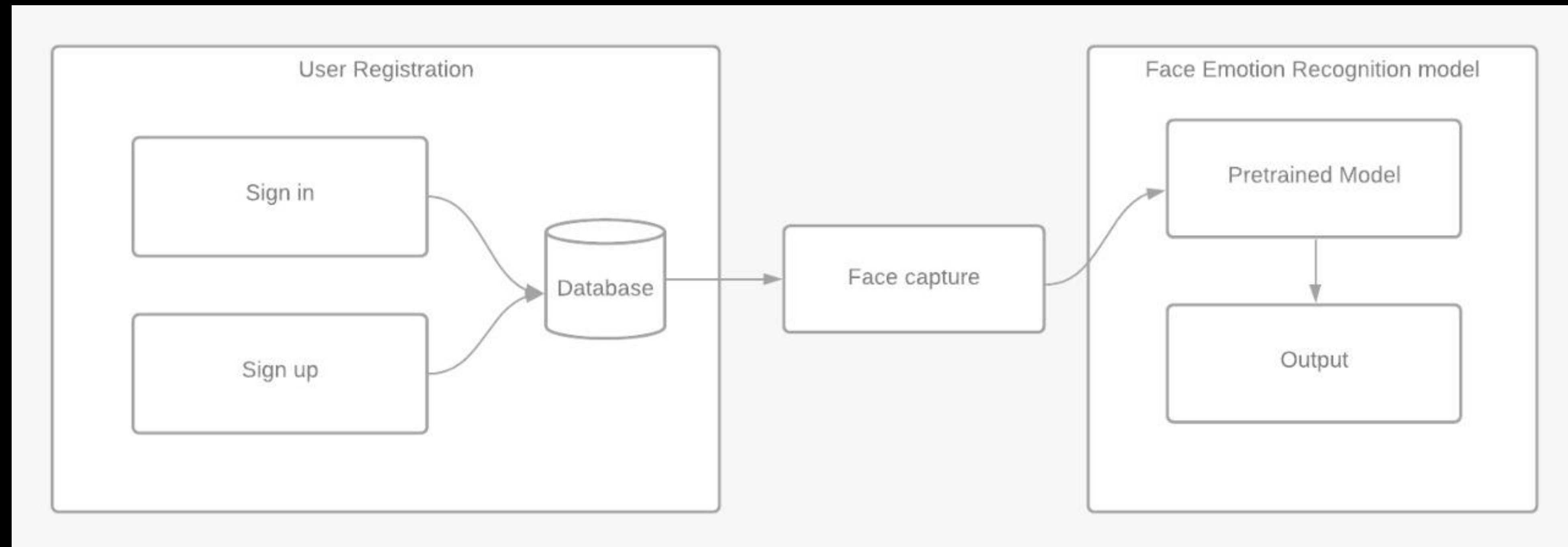
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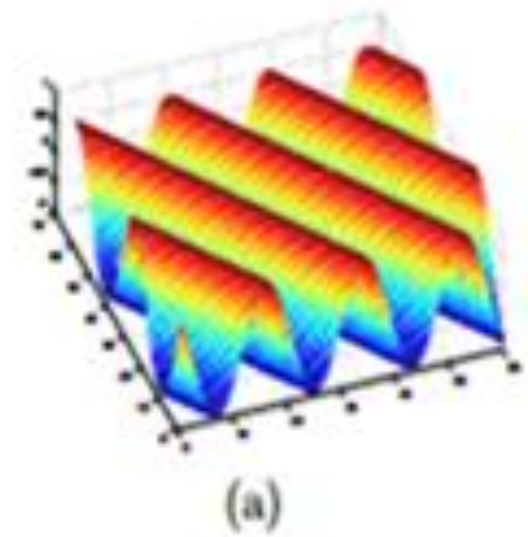
Problem definition

- The application makes the computer understand the current emotional state of its user.
- This can take the human computer interaction to the next level.
- The application of this ranges from product recommendations, mental health therapy, behaviour analysis etc

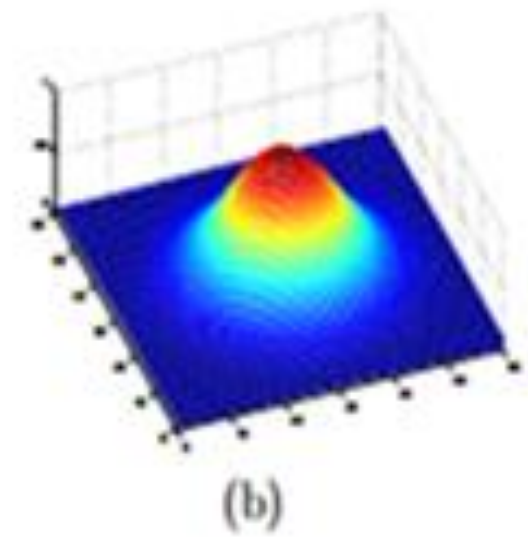
Component Diagram



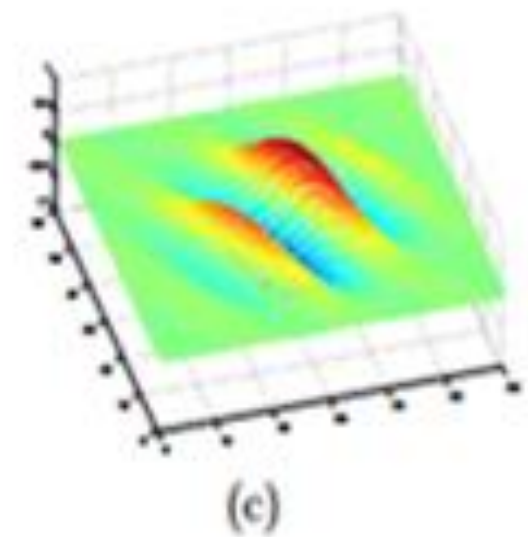
Prerequisite: Gabor filters



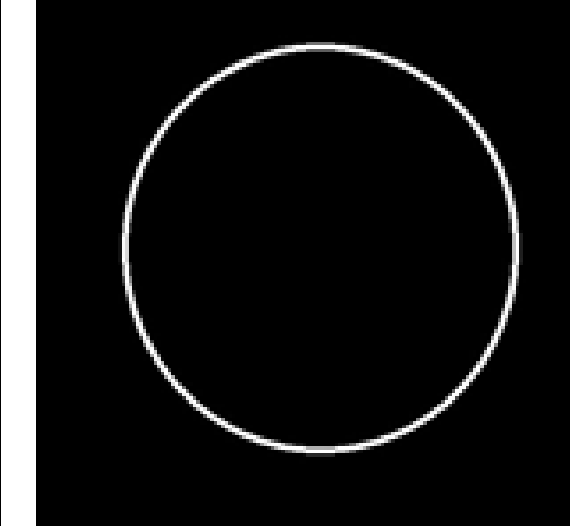
A Sinusoid oriented 30° with X-axis



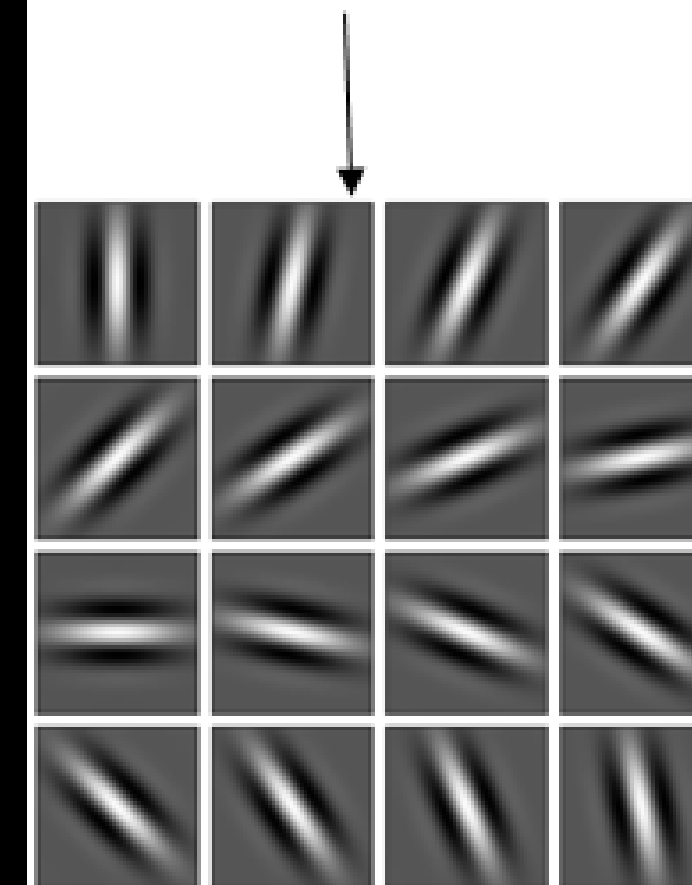
A 2-D Gaussian



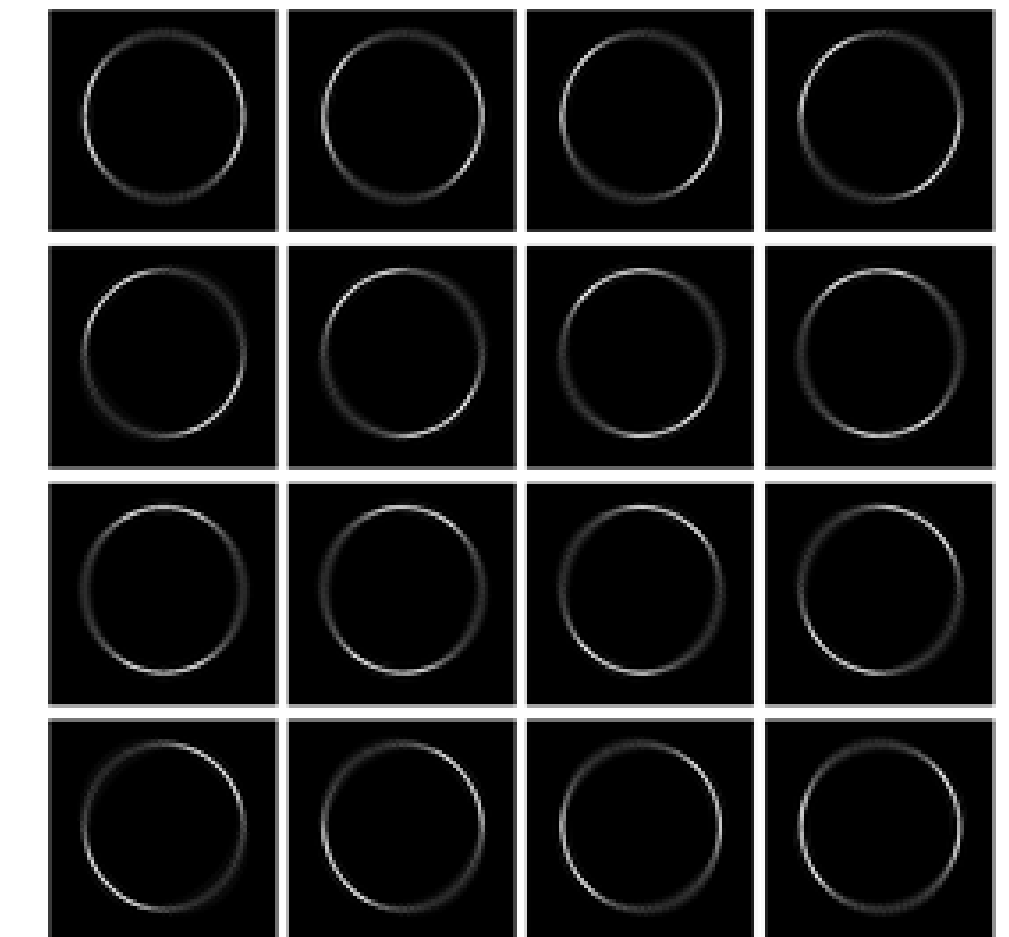
The corresponding 2-D Gabor filter



Input Image of a circle



A bank of 16 Gabor Filters

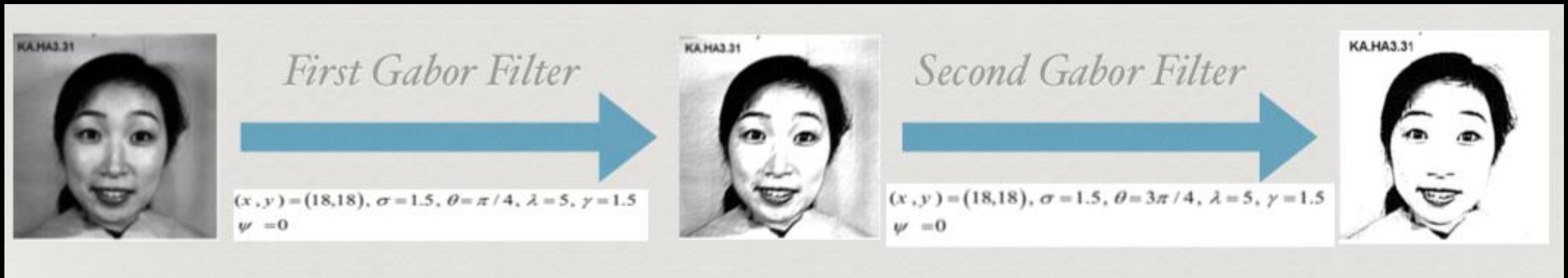


The output circle as seen when pass through individual Gabor filter

Problem definition

Image pre-processing

- We use two Gabor filters for the image pre-processing.



Problem definition

Deep learning

- The image is then passed onto the CNN model.
- Trained on the FER dataset of 35k images.
- Gives a cross validation accuracy of 93%.
- Using callbacks ReduceOnPlateau and EarlyStopping.

Project scope

- User Registration is required to check your facial emotion status.
- The user can get instant response on the their current emotional state.
- Classifies the human emotion into four discrete categories: happy, sad, angry and surprised.
- The user can get another response, without restarting the application, any number of times.

Packages and APIs

- Tkinter: To develop the front end of the application
- PIL: To handle the incoming data, in the form of images
- Opencv: To access the webcam
- Numpy: To convert the image data into pixel values for the DL model
- Tensorflow: To train, save and load the model
- Keras: API to efficiently interact with Tensorflow

Problems faced

Tensorflow and Keras version

- The model was trained on Google colab
- When using the model in the application, it was giving an error when loaded on the laptop.
- The error was stating that certain initialisers defined in the model are not defined.
- After searching for the error on github, we found that it is due to an older version of Tensorflow & Keras on the laptop

Limitations

- There needs to be adequate lighting conditions in the room.
- The light source should not be directly behind the user.
- The user cannot be very far away from the laptop's camera.

Thank you!