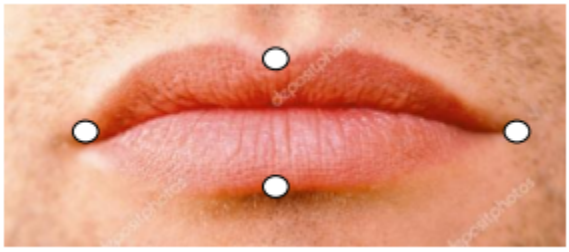
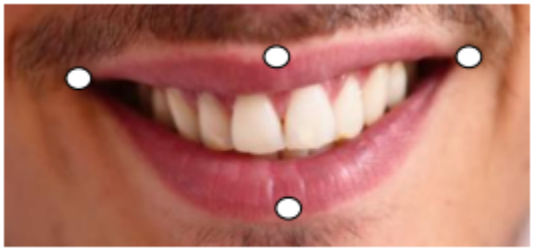
Assignment-1 EE655: CV & DL
10 Marks (Total)

Q1) Given the four key points of the mouth shown below, design at least three features that can help us monitor whether a person is smiling. **[2 Marks]**





Q2) Implement a modified LeNet architecture from scratch and train it on the MNIST dataset. Your LeNet architecture must incorporate the following changes: **[3 marks]**

- Include a softmax layer at the end.
- Use *x*sigmoid(x)* as the activation function.
- Replace average pooling with max pooling.
- Use only 3×3 filters in convolutional layers.

Q3) Implement a modified Histogram of Oriented Gradients (HoG) feature extraction algorithm from scratch, using the "Robert cross edge detector" for computing derivatives. Extract features from images in the Cat and Dog dataset and train a Random Forest classifier. **[2 marks]**

Q4) Develop an algorithm from scratch to programmatically count the number of objects present in the binary image shown below. **[3 marks]**