Facial Recognition Steps (Project Plan for Coding Portion):

- Prepare Training Data: Organize the training data. Then apply augmentations to the training data, Image augmentations allow for a more robust model on predicting on images outside the dataset. Image augmentations can be applied to all the training images or a set of the training images or certain intervals of the training images. However, these augmentations generally should not be applied to the validation set.
- Processing Training Data: Then we need to process the training data as we want to remove the weight of outside noise in our model and just utilize the faces as the input image arrays for the model. This can be done with first facial detection then cropping around the facial region so the background is removed. Further preprocessing can also be done by making the background transparent or white for square crops around the face, or more optimally going for an oval or circle crop of the face so there is as little as possible background noise input into the model.
- Train the model: The next step is to train the model on the training images with or without image augmentations applied as well depending on the approach for facial recognition. Cross validation techniques can be used to further enhance the model such as LOOCV or k-fold cross validation.
- Test the model on images outside the dataset (validation set): Finally, use images outside of the faces dataset and check the models performance by looking at its predicted labels for each of the images in the validation. There is also a way to check for the model's predicted probability of each of the class labels in the dataset this can be another metric for evaluating the model's performance, as a good model will predict a lot of the class labels correctly, but a very good model will oreduct a lot of the class labels correctly and will also have low predicted probabilities for all the other incorrect classes.
- Lastly, and most importantly. Utilize an ensemble of different models to improve prediction accuracy, this will prevent the issue of being the model being lacking in certain scenarios, specifically, by using more than one model it will prevent the issue of things like only being able to predict on images where the subject is wearing makeup or their eyes are obscured. In short, this will make the model more robust for predicting on validation images with varying ranges of quality, lighting conditions, makeup, facial obscurities, facial surgeries, taken at different time (more specifically at a different age), etc.