# Facial detection and recognition for **Life with Louie** cartoon characters

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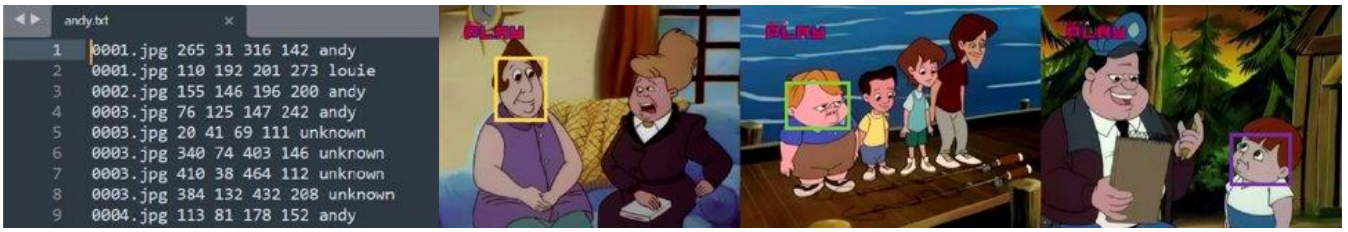
The purpose of this project is to implement a facial detection and recognition program in python to extract and classify the faces from the animated show Life with Louie. The dataset consists of screenshots from the show that contain at least one face.



The training set in divided in four subfolders, one for each main character (Louie, Andy, Ora, Tommy), and each subfolder contains 1000 images and an annotations file that has a row for which face detection with the format "*file_name, x_min, y_min, x_max, y_max, character_name*". The *file_name* represents the name of the **jpg** image where the face is, *x_min, y_min, x_max* and *y_max* represent the coordinates of the bounding box for that face and *character_name* is the name of the character detected.




First step was to extract patches with the faces and save them in folders according to the character name. Then I extracted random patches from those images that are not faces for the negative example. I normalized all the inputs to be 72 by 72 pixel images and I applied HOG (Histogram of Oriented Gradients) on all samples and trained a Linear SVC (Support Vector Classification) model.

For predictions I used a multi-scale sliding window and predicted for every patch extracted from the window if it is a face or not. Then I applied Non-maximum Suppression because there were multiple predictions for the same face that overlapped.

Next task was the face recognition, that means for each detection to say what character it is. For that I trained a Neural Network that can distinguish from four classes, the main characters of the show, and run every detection from the first task in this NN.

The grading system for this project was based on Average Precision. It is used to evaluate the quality of the model's predictions by averaging the precision at different recall levels. Precision is the number of true positive predictions divided by the number of true positive and false positive predictions, while recall is the number of true positive predictions divided by the number of true positive and false negative predictions. In other words, precision measures the proportion of correct detections among all detections, while recall measures the proportion of correct detections among all actual objects. Average precision combines these two metrics to provide a single, overall measure of a model's performance in object detection tasks.