Code Review

## Run\_all\_pipeline.py

* Line 1-10: Imports all used keras functions and video formatting functions.
* Line 13-82: Defines the pipeline function:

1. Line 17-36: Reformats the number of frames and resolution to a suitable format for the machine learning model and labels the duration, fps and number of frames. Uses the function video\_array from src.io\_data to retrieve all the video data and reformat the video.
2. Line 38-48: Loads the 3D Convolutional Neural Network from numpy and extracts the features of the formatted video (video\_array).
3. Line 50-60: Loads the video localization model and reshapes the video.
4. Line 62-82: Post processing on smoothing, activity localization and displaying all relevant model information.

* Line 85-235: 3D Convolutional feature extraction:

1. Performs convolution on different resolutions of the layer sequentially

* Line 235-253: Temporal Localisation:

1. Line 238-241: Retrieves extracted features and normalizes the layer using the extracted features.
2. Line 242-247: Extracts LSTM features of the extracted layers.

## Extract\_features.py

* Line 1-14: Imports all required functions including numpy and h5py.
* Line 17-157: Defining Feature Extraction:

1. Line 24-29: Setting up an output file and path.
2. Line 36-46: Printing video list features and setting up parallel processing.
3. Line 48-77: Generates data for the video queue input and assigns those processes to a thread.
4. Line 81-121: Loads the C3D model and extracts features while appropriate, sets different processes to run simultaneously.
5. Line 126-148: Creates a function to save extracted features and store those on the hdf5 file. Uses multiple processes.
6. Line 146-157: Joins processes to run unimpeded.

* Line 160-310: Performs the feature extraction on C3D layers.

1. Line 170-294: Each layer is processed and run through the keras model.
2. Line 295-310: Post C3D labeling and model summary.

* Line 313-368: File management and directory control.

## Predict.py

* Line 12-84: Extracting predicted outputs:
  1. Line 12-34: Initialising key prediction factors such as paths and inputs.
  2. Line 36-44: Performing LSTM and storing the results for later use.
  3. Line 44-54: Setting outputs and readying the model for use.
  4. Line 56-84: Loading videos and predicting video output using h5\_predict, then shaping the video with respect to the stored videos. Presenting this information to the user, using the video progress bar.
* Line 87-155: Parsing arguments and directing file access.

## Process\_prediction.py

* Line 15-100: Process prediction:
  1. Line 23-35: Initialisation and imports.
  2. Line 39-46: Setting up process prediction for data subsets.
  3. Line 50-66: Retrieving subset data, information, generating a prediction and labelling outcome classification. Storing all relevant labels.
  4. Line 68-83: Performing post-processing on the video subset and attaching labels.
  5. Line 86-100: Formatting subset outputs.
* Line 103-160: Parsing arguments and directing files.

## Train.py

* Line 12-93: Training the input dataset.
  1. Line 14-24: Printing dataset information to the screen.
  2. Line 26-34: Importing input data (features, shape, normalisation and dropout).
  3. Line 35-42: Performing LSTM for all the video layers.
  4. Line 48-73: Storing the model data and displaying the retrieved information.
  5. Line 75-93: Fits the models to the number of epochs, then resets the states and saves all the trained data.
* Line 96-181: Parsing arguments and directing file access.

## Create\_stateful\_dataset.py

* Line 13-137: Separating video data into subsets, ready to be processed.
  1. Line 27-36: Verifying and importing video data and labels.
  2. Line 38-46: Initialising subset variables.
  3. Line 48-56: Formatting stacks for video data.
  4. Line 57-66: Appending video data together in stacks and formatting for the next batch.
  5. Line 78-100: Attaching video features and shaping the corresponding batch.
  6. Line 113-137: Creating the dataset with formatted batches and specifying whether the dataset is training data.
* Line 140-210: Parsing arguments and directing file access.