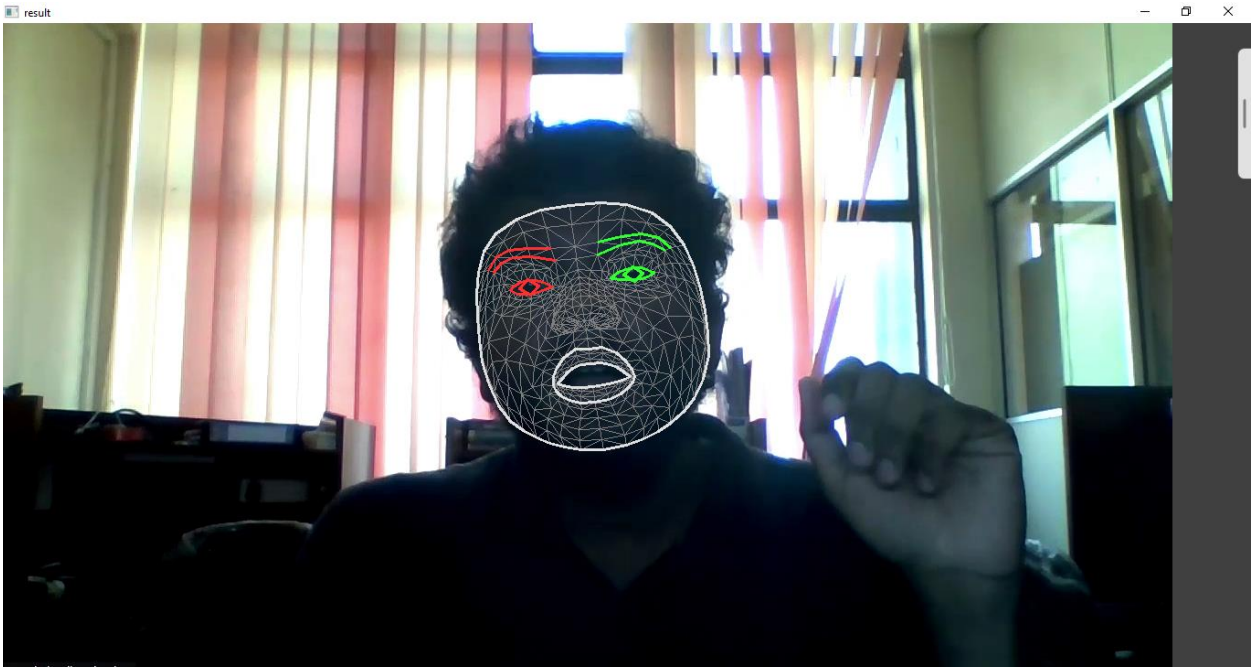
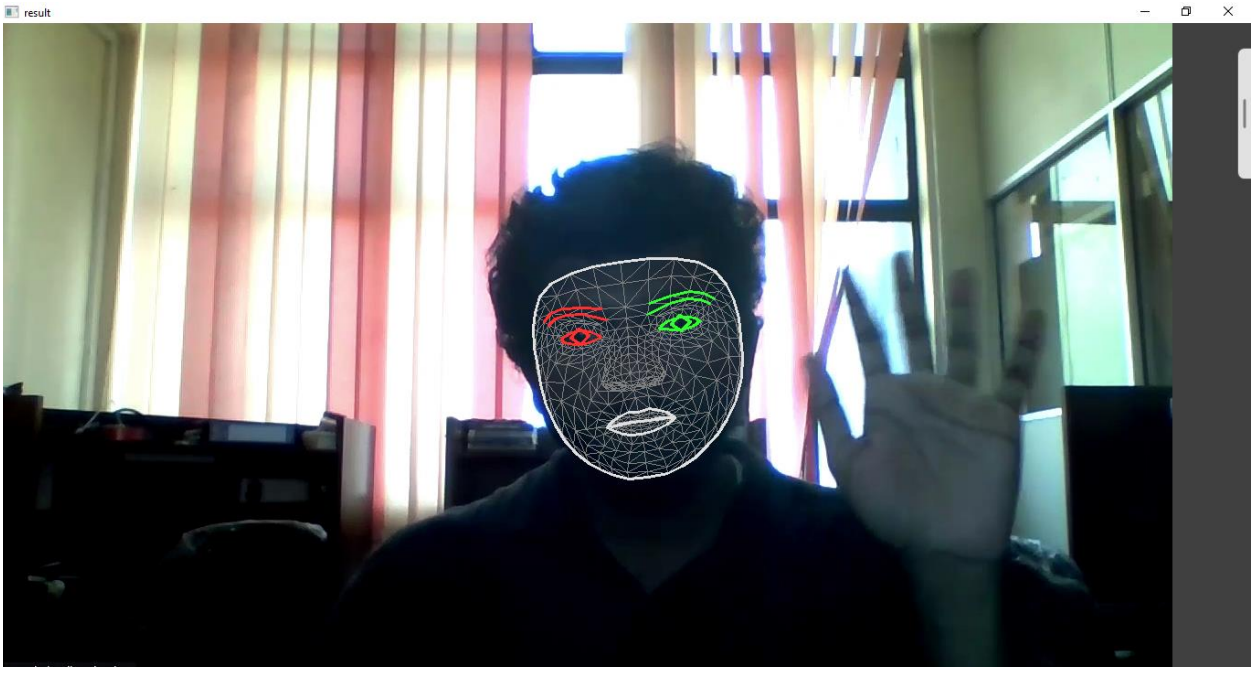
Programming task result interpretation – Hoashalarajh Rajendran

Observation:

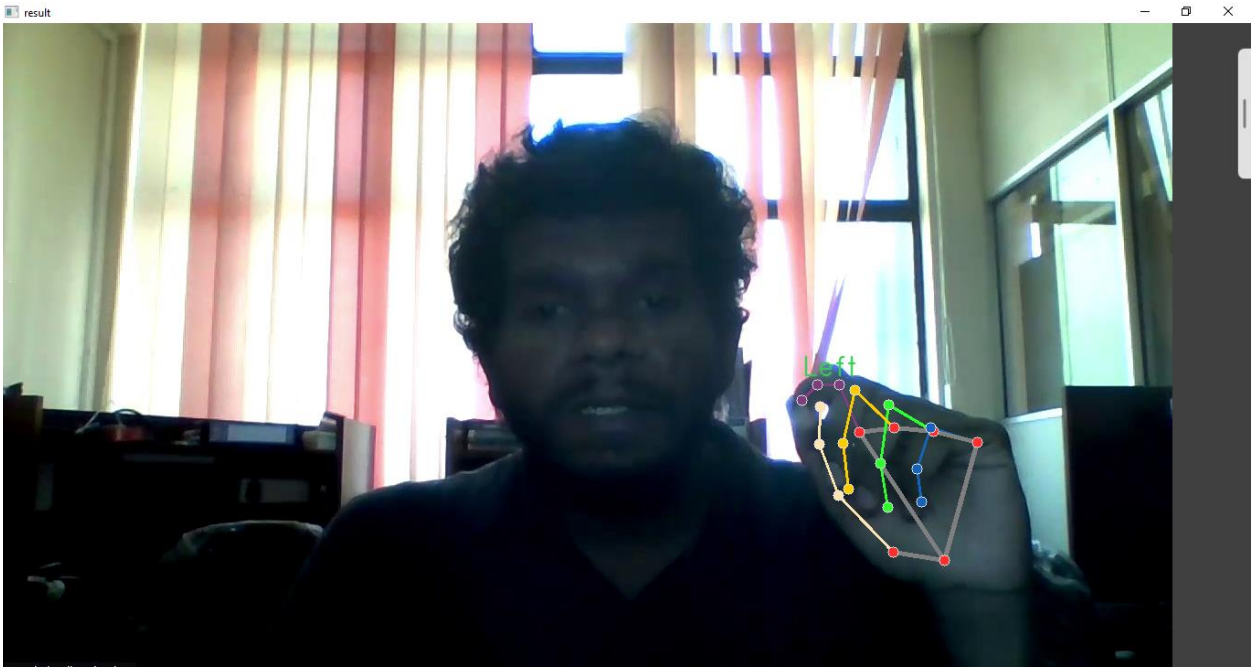
- Facial landmark data has 468 landmarks and hand gesture data has 21 landmarks.
- Each of the facial landmark data and hand gesture landmark data has three coordinates per landmark.
- Facial landmark detection during speaking state is shown below:



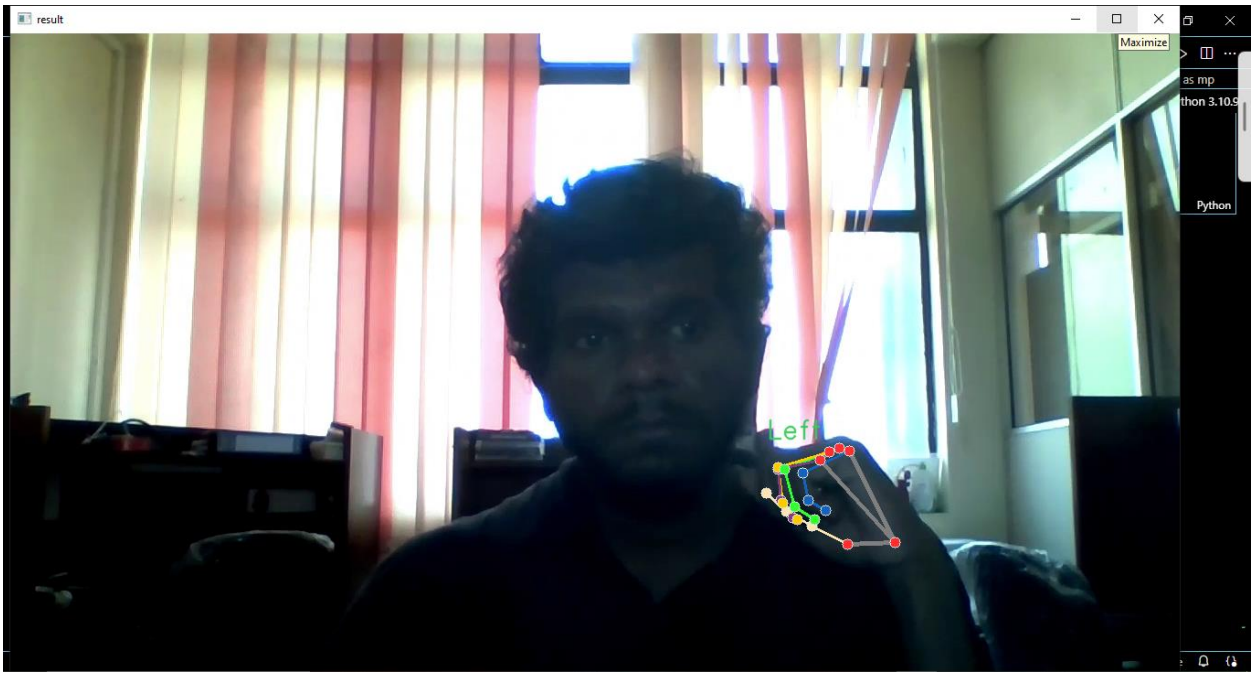
- Facial landmark detection during idle state is shown below:



- Hand landmark detection during speaking state is shown below:

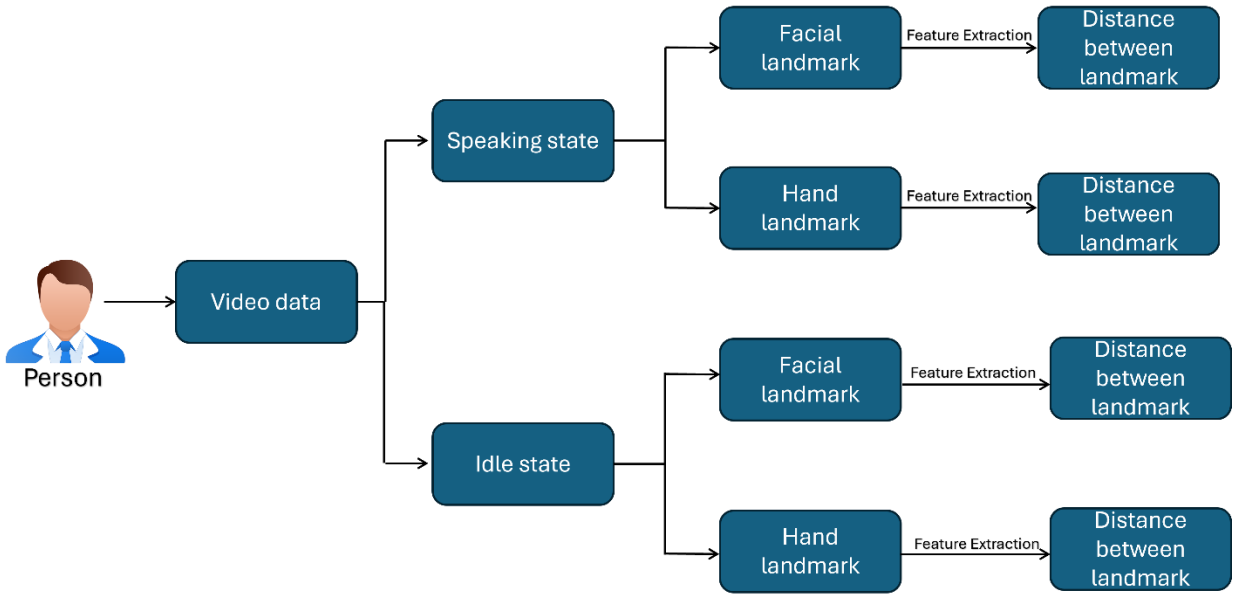


- Hand landmark detection during idle state is shown below:



Methodology:

- Distance between facial landmarks were calculated using the “Euclidean Distance” method to reduce the dimension of data.
- 16 distance-based features were created from the facial landmark data for both speaking and idle state.
- Distance between hand gesture landmarks were calculated using the “Euclidean Distance” method to reduce the dimension of data.
- 10 distance-based features were created from the hand landmark data for both speaking and idle state.
- Then two-sample t-tests are conducted as the data gathered from speaking and idle state are independent.
- Detailed methodology is illustrated below as a pictorial representation.

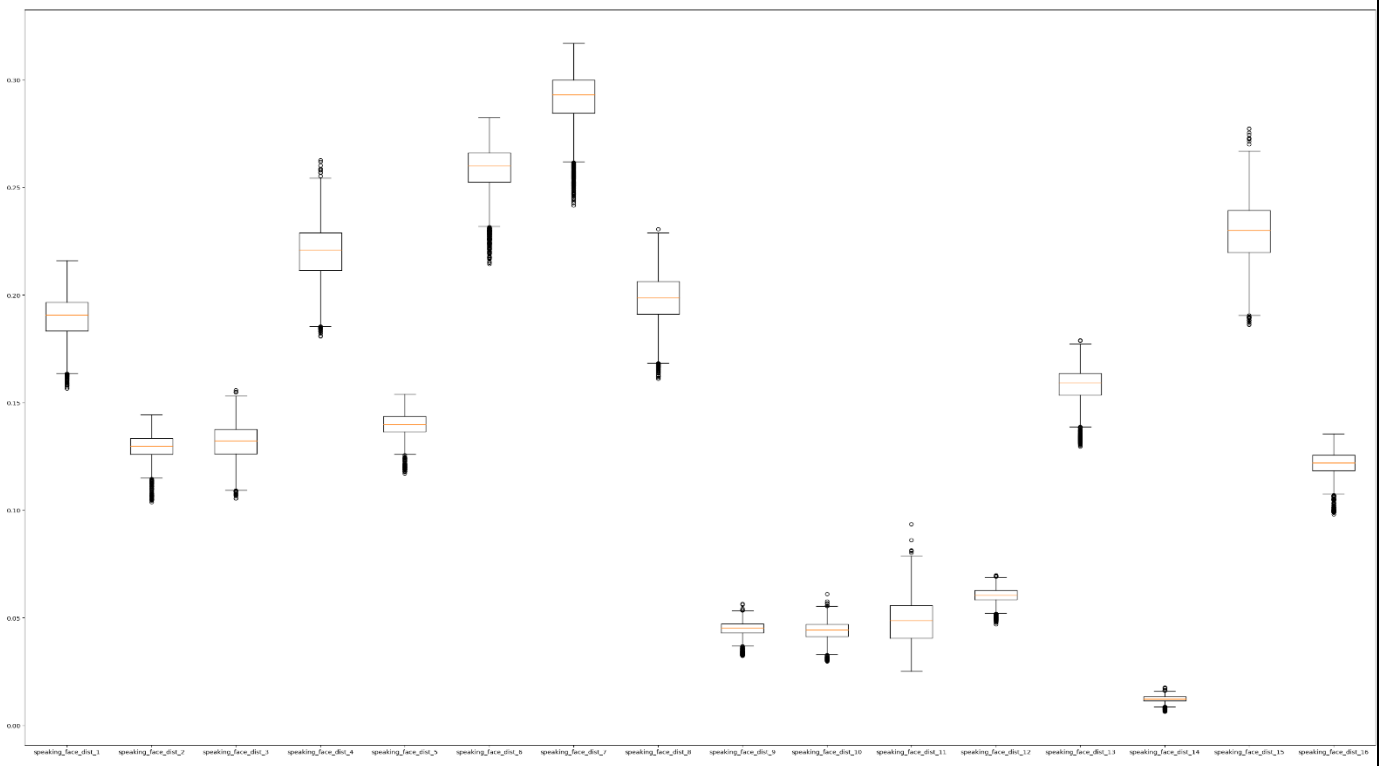


*Distance was calculated using the Euclidean distance between two landmark points for both facial and gestural data

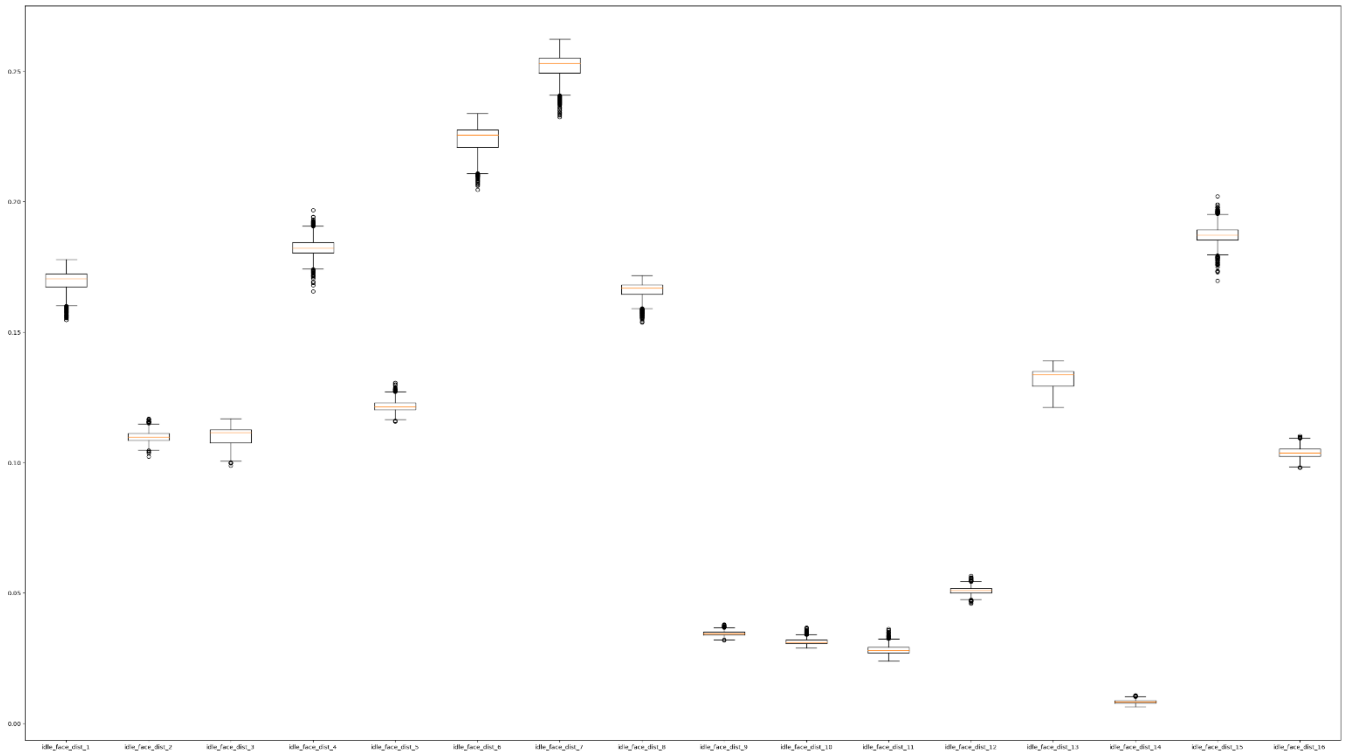
Interpretation of the results of the statistical test conducted.

For Distance between facial landmark data:

The box plot of variation distance between various facial landmark points are shown below for speaking state:



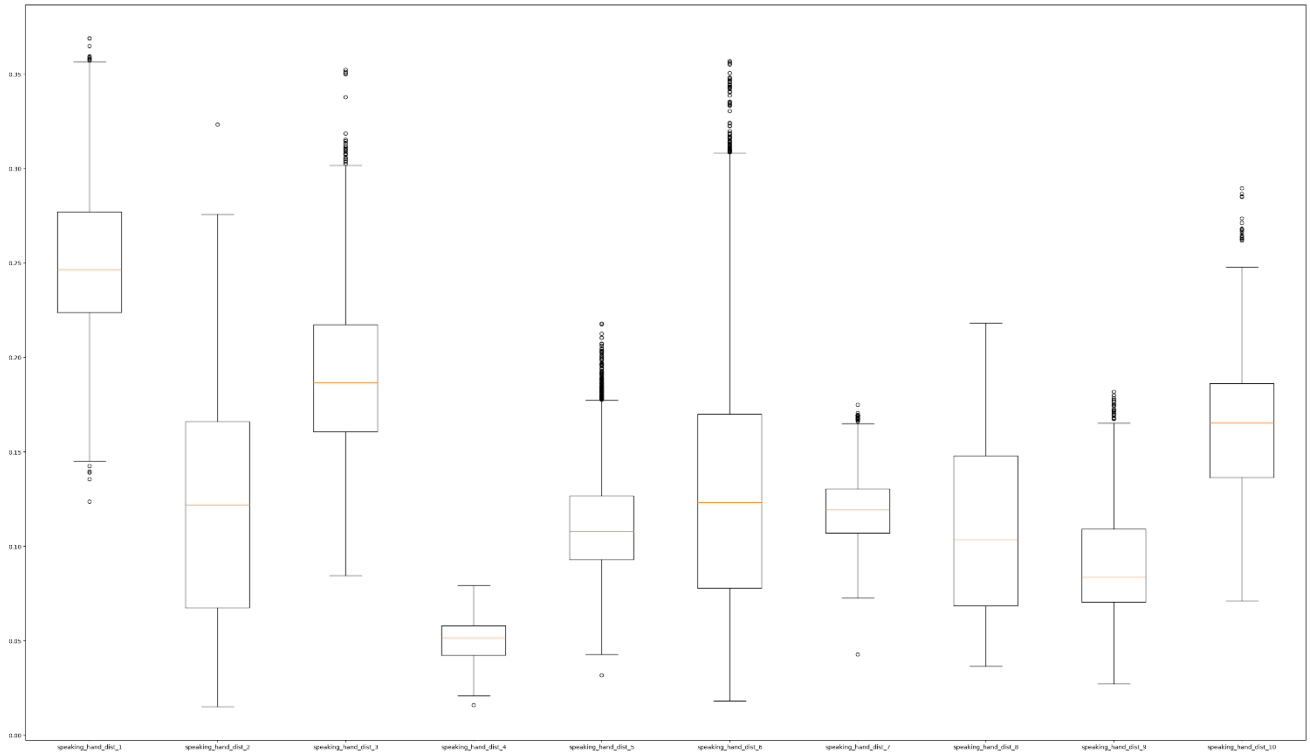
The box plot of variation distance between various facial landmark points are shown below for idle state:



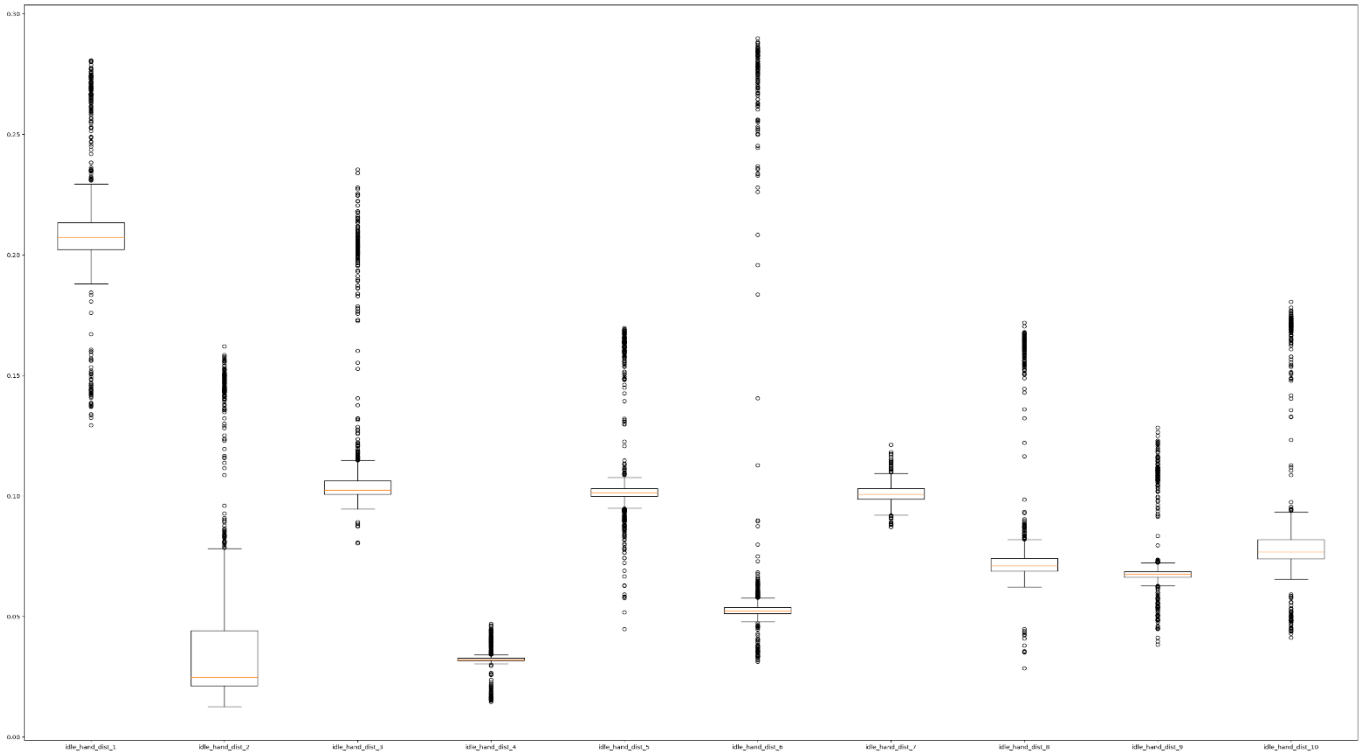
- From the boxplot itself there is observable that the distance among facial landmarks varies when comparing between idle and speaking state.
- The two-sample t-test conducted considering the variances of two samples showed that for all 16 extracted (distance between facial landmark) features there is statistically significant difference in the means of speaking and idle state considering the significance level of 0.05. (All of the p-values were less than 0.05)

<u>For Distance between facial landmark data:</u>

The box plot of variation distance between various hand gesture landmark points are shown below for speaking state:



The box plot of variation distance between various hand gesture landmark points are shown below for idle state:



- From the boxplot itself there is observable that the distance among hand gesture landmarks varies when comparing between idle and speaking state.
- The two-sample t-test conducted considering the variances of two samples showed that for all 10 extracted (distance between hand landmark) features there is statistically significant difference in the means of speaking and idle state considering the significance level of 0.05. (All p-values were less than 0.05)

Thank you.