CS 306 Mini Project

Group - 2

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Problem Description

Measure video quality difference from 144 HDR video ratings and 100 full HD video ratings given on a scale of 1-5, each for 24 observers taken independently.

Two measures have been used to quantify the quality:

- MOS: Mean Observed Score

  MOS = **sum(Scores)/N**

- PDU: Percentage Dissatisfied Users

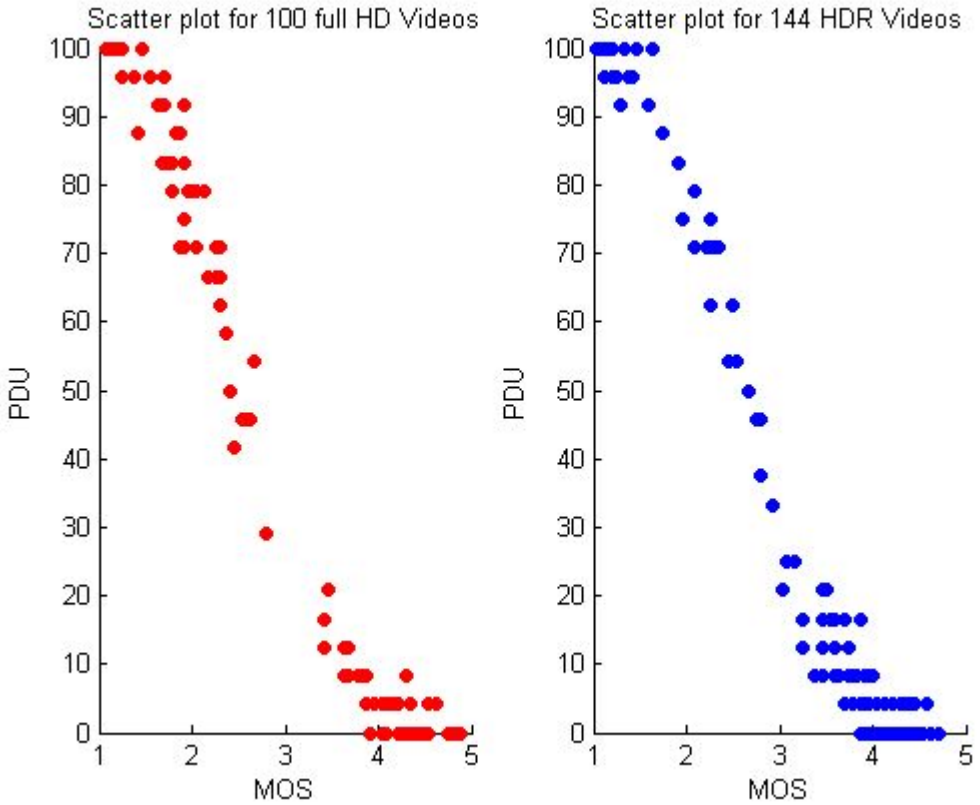
$$PDU = \frac{\#(OS < th)}{N} \times 100$$

The main aim is to find the relationship between PDU values and MOS and predict PDU for new MOS values.

Question 1 - Relation between MOS and PDU

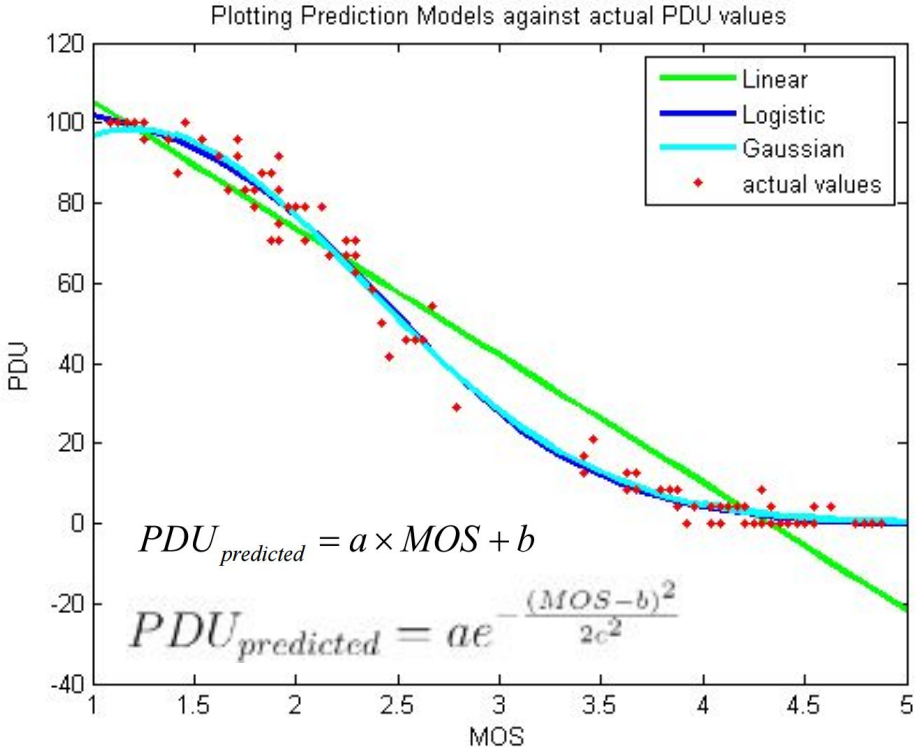
Model	Threshold = 2	Threshold = 3
	r	r
MOS, PDU1	-0.8508	-0.9803
MOS, PDU2	-0.8881	-0.9796

There is a negative correlation between MOS and PDU. This follows logically because if the scores for videos are high, the percent dissatisfied users tend to be lower.

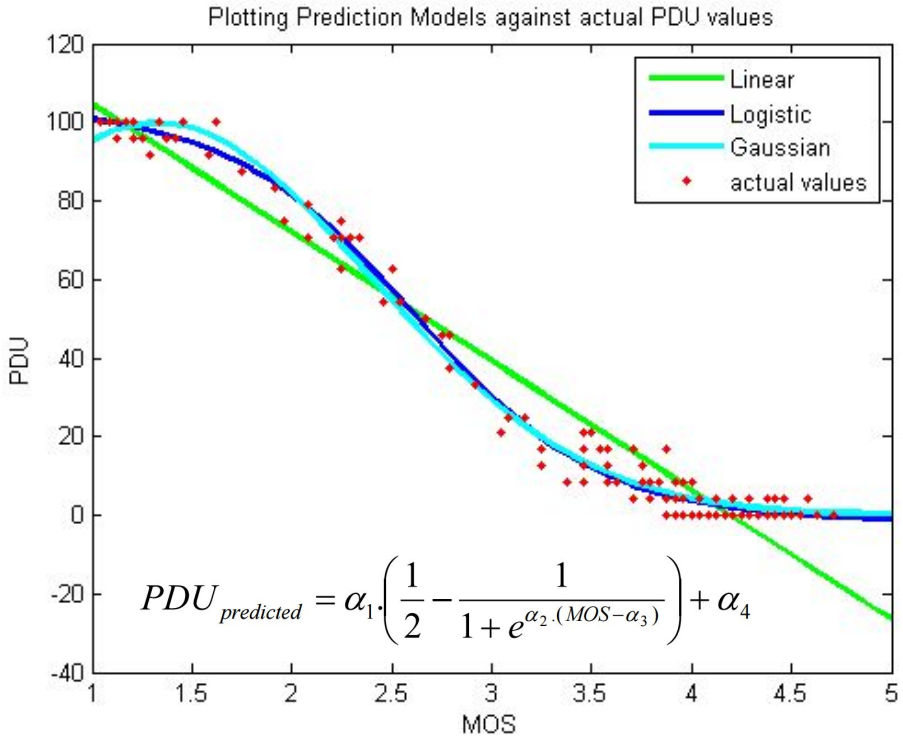


Question 2 - Predicting PDU from MOS

PDU prediction models for both datasets



data_100



data_144

Question 3 - Analysis based on F-Test

Null Hypothesis: Variance of errors with methods A and B are same
Alternate Hypothesis: Variance of errors of A is greater than B

	PDU prediction model A	PDU prediction model B	f_critical	f	Inference (better model)
data_100	Linear	Logistic	0.7173	3.5640	Logistic
	Gaussian	Logistic	0.7173	1.0240	Logistic
	Linear	Gaussian	0.7173	3.4804	Gaussian
data_144	Linear	Logistic	0.7588	4.8487	Logistic
	Gaussian	Logistic	0.7588	1.0671	Logistic
	Linear	Gaussian	0.7588	4.5438	Gaussian

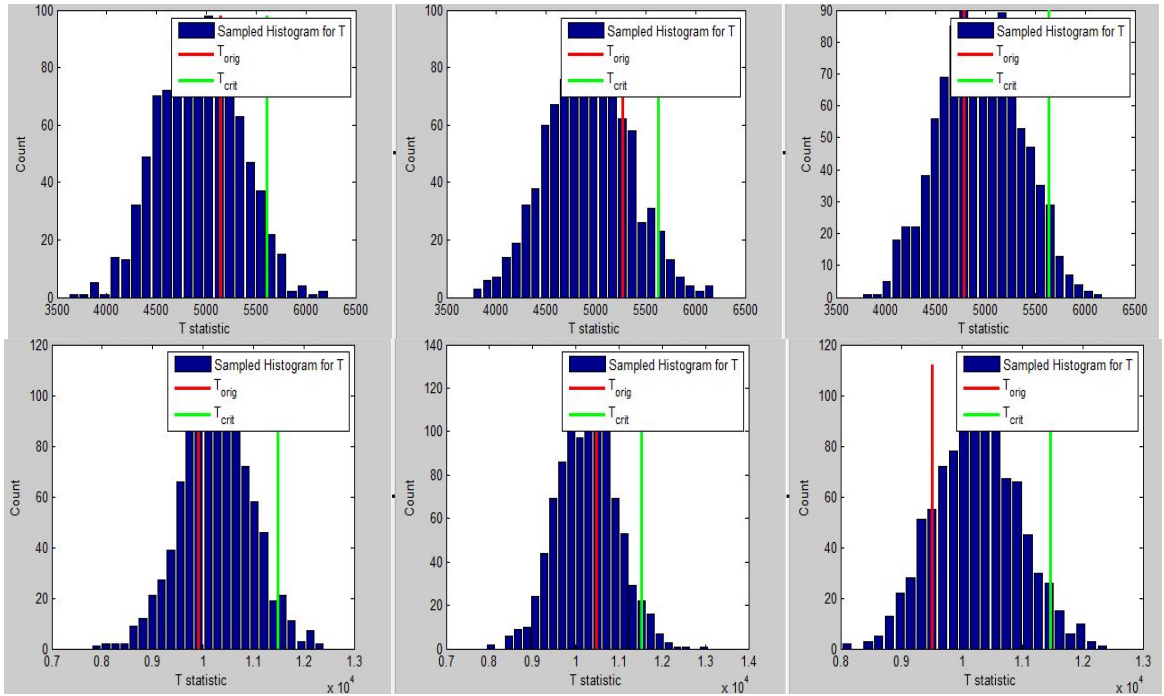
Based on accuracy of prediction models, Logistic > Gaussian > Linear

Question 4 - Comparing models using non-parametric testing

Linear vs Logistic

Linear vs Gaussian

Gaussian vs Logistic



Sampling distribution of Error Values

Using the Wilcoxon statistic, We find that for both the datasets ‘data_100’ and ‘data_144’:

Linear < Gaussian < Logistic

Question 5 - Determining MSE values

Model	MSE value
Logistic	16.4432
Gaussian	16.7014
Linear	72.2810

Trained using data_100, tested using data_144

Model	MSE value
Logistic	24.3376
Gaussian	25.2730
Linear	68.6367

Trained using data_144, tested using data_100

In both cases, we observe that the order of performance .based on MSE values is:
Logistic > Gaussian > Linear

Using 3 metrics - f test, non parametric test and comparison of MSE values for 2 different data sets - data_100 and data_144, we observe that **logistic is the best prediction model for PDU from MOS values followed by gaussian and linear prediction models.**