

# STRESS CLASSIFICATION

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Feature Selection - GSR

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## ONE FEATURE AT A TIME

Average : 0.831604842989

Minimum : 0.862667233962

Maximum : 0.863896301944

Slope : 0.71959619328

Mean Peak Height : 0.745640741766

No.of Peaks : 0.745815465486

25th Perc. : 0.864959696539

50th Perc. : 0.861360292373

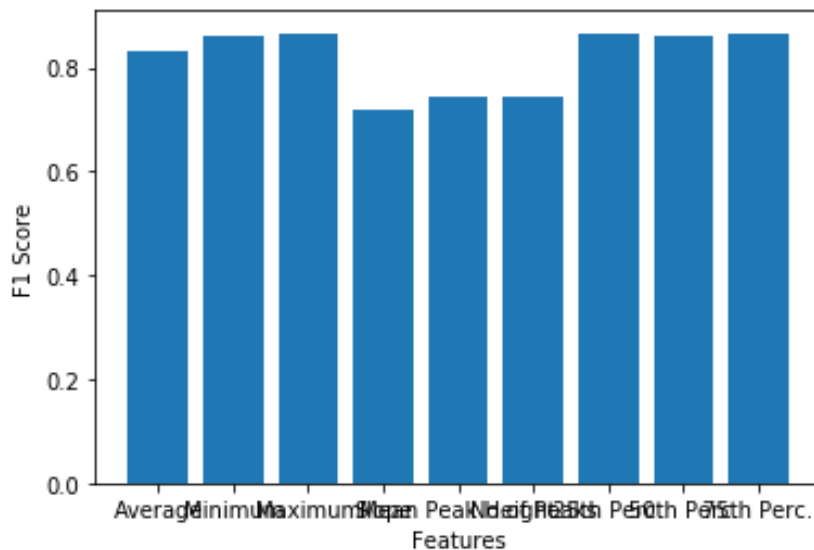
75th Perc. : 0.866254074739

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The best feature is: 75th Perc.

F1 Score = 0.866254074739

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F1 Score for a Decision Tree Classifier for GSR Features Trained for ONE feature at a time



## Feature Ranking – GSR (worst to best)

Slope

Mean Peak Height

No.of Peaks

Average

50th Perc.

Minimum

Maximum

25th Perc.

75th Perc.

## **TWO FEATURES AT A TIME**

Average & Minimum : 0.869419589454  
Average & Maximum : 0.867063111452  
Average & Slope : 0.988656275938  
Average & Mean Peak Height : 0.82228524732  
Average & No.of Peaks : 0.830068512979  
Average & 25th Perc. : 0.867984265567  
Average & 50th Perc. : 0.863819577735  
Average & 75th Perc. : 0.866714662827

Minimum & Maximum : 0.883798456996  
Minimum & Slope : 0.988464377999  
Minimum & Mean Peak Height : 0.859821171041  
Minimum & No.of Peaks : 0.865805405921  
Minimum & 25th Perc. : 0.878894044125  
Minimum & 50th Perc. : 0.874550614948  
Minimum & 75th Perc. : 0.870687586968

Maximum & Slope : 0.987914988193  
Maximum & Mean Peak Height : 0.856746676867  
Maximum & No.of Peaks : 0.862154669726  
Maximum & 25th Perc. : 0.873526055534  
Maximum & 50th Perc. : 0.876055934711  
Maximum & 75th Perc. : 0.88072869474

Slope & Mean Peak Height : 0.746764691072  
Slope & No.of Peaks : 0.723526643309  
Slope & 25th Perc. : 0.988434492968  
Slope & 50th Perc. : 0.98876300578  
Slope & 75th Perc. : 0.988951042485

Mean Peak Height & No.of Peaks : 0.745640741766  
Mean Peak Height & 25th Perc. : 0.856882668712  
Mean Peak Height & 50th Perc. : 0.850805869618  
Mean Peak Height & 75th Perc. : 0.855272588275

No.of Peaks & 25th Perc. : 0.863080450984  
No.of Peaks & 50th Perc. : 0.859167744098  
No.of Peaks & 75th Perc. : 0.86391488149

25th Perc. & 50th Perc. : 0.868646487721  
25th Perc. & 75th Perc. : 0.873446058585

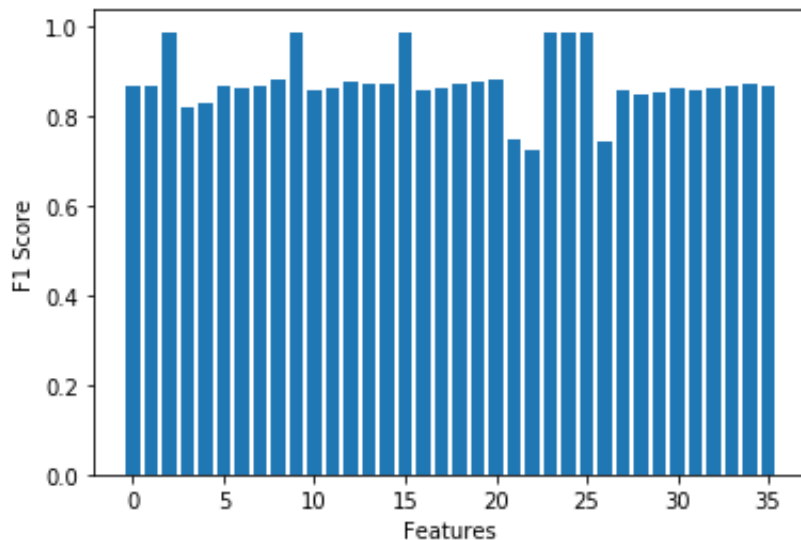
50th Perc. & 75th Perc. : 0.867064724146

\*\*\*\*\*The  
best combination of features is: Slope & 75th Perc.

F1 Score = 0.988951042485

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F1 Score for a Decision Tree Classifier for GSR Features Trained for TWO features at a time



----- Successive Forward Feature Selection (Features and F1 Score) -----

['75th Perc.']

0.866254074739

['50th Perc.' '75th Perc.']

0.866755878417

['Average' '50th Perc.' '75th Perc.']

0.872589828238

['Average' 'Minimum' '50th Perc.' '75th Perc.']

0.878272501433

['Average' 'Minimum' '25th Perc.' '50th Perc.' '75th Perc.']

0.87955315797

['Average' 'Minimum' 'Maximum' '25th Perc.' '50th Perc.' '75th Perc.']

0.881929548596

['Average' 'Minimum' 'Maximum' 'Slope' '25th Perc.' '50th Perc.' '75th Perc.']

0.990353104085

['Average' 'Minimum' 'Maximum' 'Slope' 'Mean Peak Height' '25th Perc.' '50th Perc.' '75th Perc.']

0.989428004247

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Feature Selection - Speech

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### ONE FEATURE AT A TIME

Std.Deviation : 0.558214188705

Slope : 0.703623570481

Skewness : 0.555451081308

Kurtosis : 0.553307412269

Average : 0.570481256959

Maximum : 0.703606199086

Minimum : 0.702590365917

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The best feature is: Slope

F1 Score = 0.703623570481

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### **Feature Ranking – Speech (Worst to Best)**

Kurtosis

Skewness

Std.Deviation

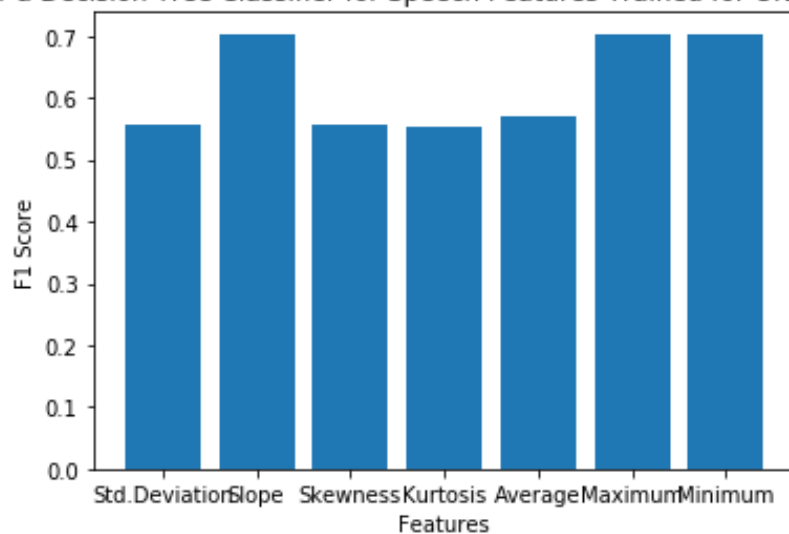
Average

Minimum

Maximum

Slope

F1 Score for a Decision Tree Classifier for Speech Features Trained for ONE feature at a time



### TWO FEATURES AT A TIME

Std.Deviation & Slope : 0.586588863614

Std.Deviation & Skewness : 0.552888184923  
Std.Deviation & Kurtosis : 0.552681137873  
Std.Deviation & Average : 0.575911031675  
Std.Deviation & Maximum : 0.592480905653  
Std.Deviation & Minimum : 0.592552324001

Slope & Skewness : 0.582898156169  
Slope & Kurtosis : 0.576754385965  
Slope & Average : 0.95824862399  
Slope & Maximum : 0.693481481481  
Slope & Minimum : 0.668897813476

Skewness & Kurtosis : 0.550252443604  
Skewness & Average : 0.571591190299  
Skewness & Maximum : 0.58683788122  
Skewness & Minimum : 0.580363958728

Kurtosis & Average : 0.577733990148  
Kurtosis & Maximum : 0.591855427652  
Kurtosis & Minimum : 0.581749708877

Average & Maximum : 0.59163923471  
Average & Minimum : 0.585000861454

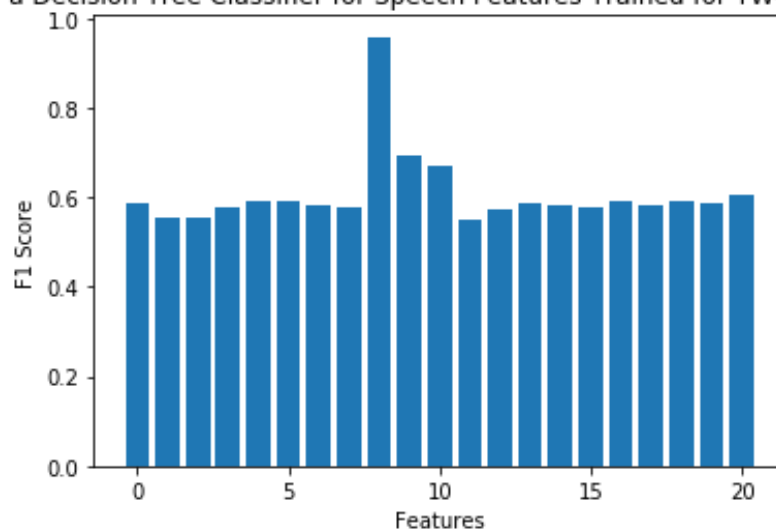
Maximum & Minimum : 0.603028798411

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The best combination of features is: Slope & Average

F1 Score = 0.95824862399

F1 Score for a Decision Tree Classifier for Speech Features Trained for TWO features at a time



----- Successive Forward Feature Selection (Features and F1 Score) -----

['Slope']

0.703623570481

['Slope' 'Skewness']  
0.58255026901  
['Slope' 'Skewness' 'Minimum']  
0.672941293335  
['Slope' 'Skewness' 'Maximum' 'Minimum']  
0.790199537808  
['Slope' 'Skewness' 'Average' 'Maximum' 'Minimum']  
0.890746741201  
['Slope' 'Skewness' 'Kurtosis' 'Average' 'Maximum' 'Minimum']  
0.88095002474

## SENSOR FUSION

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### Best two GSR Features

F1 Score = 0.98885858259  
Recall = 0.991839005843  
Precision = 0.985896017699  
Accuracy = 0.986709314509

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### Best two Speech Features

F1 Score = 0.958179429336  
Recall = 0.956874783384  
Precision = 0.959487637772  
Accuracy = 0.953820043251

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### Speech and GSR Features

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Best of speech and GSR

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F1 Score = 0.820407208051  
Recall = 0.812760827228  
Precision = 0.828198828199  
Accuracy = 0.78839684553

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Best two of speech and GSR

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F1 Score = 0.983726644722  
Recall = 0.983863488825  
Precision = 0.98358983868  
Accuracy = 0.980643026526