

Q1:

- i. The dataset contains **80** instances.
- ii. The dataset contains **7** input attributes.
- iii. The output attribute has **two possible** values.
- iv. Two input attributes are categorical which are Hair Length and eye color.
- v. The class ratio of Male-Female is (46-34) which is (1.4).

Q2:

1) Standard Train/Test Split

92% accuracy: So **3** instances were incorrectly classified using the **Random Forest algorithm**.

74% accuracy: So **7** instances were incorrectly classified using the **Support Vector Machine algorithm**.

55% accuracy: So **11** instances were incorrectly classified using the **Multilayer Perceptron Classifier**.

2) 80/20 Train Test Split

100 % accuracy: So **0** instances were incorrectly classified using the **Random Forest algorithm**.

81 % accuracy: So **5 instances** were incorrectly classified using the **Support Vector Machine algorithm**.

93% accuracy: So **2** instances were incorrectly classified using the **Multilayer Perceptron Classifier**.

- In 80/20 split the accuracy of the model increases, which can be seen that less number of instances were classified incorrectly.

3) Scarf and Beard are the most powerful attributes in the Prediction task because they have **distinct** values for males and females in almost most of the instances.

4) By removing the above two attributes the accuracy of the system is **reduced.** Like by applying specified classifier algorithms the accuracy compared to previous decreases.

Q 3: Monte Carlo cross-validation:

F1 Score: 0.94 Parameters: ShuffleSplit(train_size=0.66, test_size=0.34, n_splits = 5)

Leave P-Out cross-validation:

F1 Score: 0.96 Parameters: p=5

Q 4: 5 instances for testing are:

I create another .csv file named as gender-prediction-test, and add the below 5 instances for testing in that file. After applying the accuracy was 80%

1. height: **63**, Beard: **no**, weight: **150**, hair length: **medium**, shoe size: **41**, scarf: **yes**, eye color: **blue**, gender: **female**

2. height: **81**, Beard: **no**, weight: **182**, hair length: **Short**, shoe size: **38**, scarf: **NO**, eye color: **brown**, gender: **female**

3. height: **76**, Beard: **Yes**, weight: **170**, hair length: **Long**, shoe size: **37**, scarf: **NO**, eye color: **brown**, gender: **Male**

4. height: **85**, Beard: **Yes**, weight: **200**, hair length: **Bald**, shoe size: **44**, scarf: **NO**, eye color: **Grey**, gender: **Male**

5. . height: **79**, Beard: **NO**, weight: **119**, hair length: **Short**, shoe size: **40**, scarf: **NO**, eye color: **black**, gender: **Male**

precision recall f1-score support

| | | | | |
|----------|-------------|-------------|-------------|----------|
| 0 | 1.00 | 0.50 | 0.67 | 2 |
| 1 | 0.75 | 1.00 | 0.86 | 3 |

| | | | | |
|---------------------|-------------|-------------|-------------|----------|
| accuracy | | 0.80 | 5 | |
| macro avg | 0.88 | 0.75 | 0.76 | 5 |
| weighted avg | 0.85 | 0.80 | 0.78 | 5 |

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