Bangladesh University of Business & Technology (BUBT)



Assignment 01

"Data Mining Lab" CSE-476

Submitted by

Habibullah ID: 18192103080

Sec: **03** Intake: **41**

Submitted to

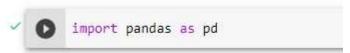
Khan Md. Hasib

Assistant Professor

Department of Computer Science & Engineering

1. Apply data preprocessing steps (such as: Viewing your data, Handling duplicates, Column cleanup, DataFrame slicing, selecting, extracting) in the following dataset https://www.kaggle.com/datasets/selinraja/irish-data

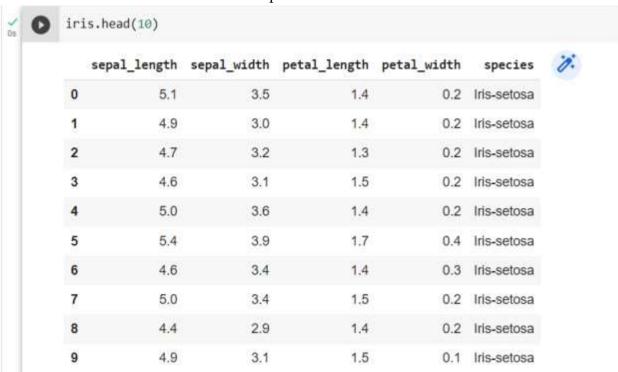
1. Import Library



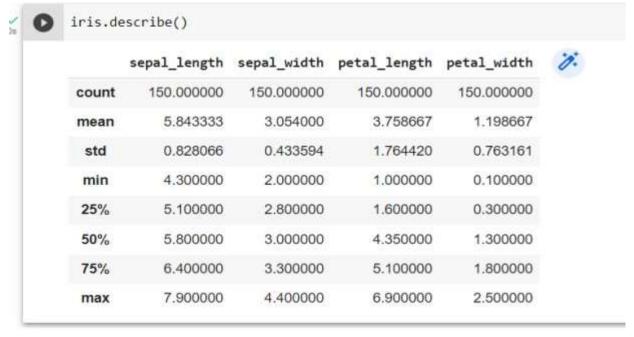
2. Upload the dataset & Viewing the data

	sepal_length	sepal_width	petal_length	petal_width	species
0	5.1	3.5	1.4	0.2	Iris-setosa
1	4.9	3.0	1.4	0.2	Iris-setosa
2	4.7	3.2	1.3	0.2	Iris-setosa
3	4.6	3.1	1.5	0.2	Iris-setosa
4	5.0	3.6	1.4	0.2	Iris-setosa
	(944)	(447)	tere	(949	100
145	6.7	3.0	5.2	2.3	Iris-virginica
146	6.3	2.5	5.0	1.9	Iris-virginica
147	6.5	3.0	5.2	2.0	Iris-virginica
148	6.2	3.4	5.4	2.3	Iris-virginica
149	5.9	3.0	5.1	1.8	Iris-virginica

3. View the top 10 rows of the dataset.



4. Showing the description of the whole dataset.



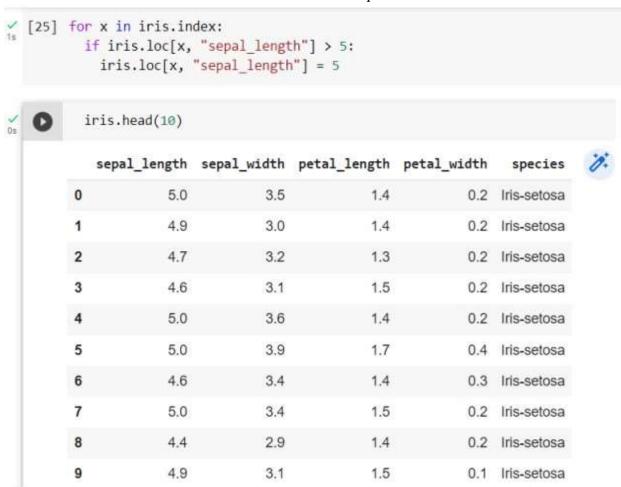
5. Showing the info of the dataset.



6. Dropping the duplicate data

	sepal_length	sepal_width	petal_length	petal_width	species
0	5.1	3.5	1.4	0.2	Iris-setosa
1	4.9	3.0	1.4	0.2	Iris-setosa
2	4.7	3.2	1.3	0.2	Iris-setosa
3	4.6	3.1	1.5	0.2	Iris-setosa
4	5.0	3.6	1.4	0.2	Iris-setosa
-	400	5510 Care	***	(100 th	7444
145	6.7	3.0	5.2	2.3	Iris-virginica
146	6.3	2.5	5.0	1.9	Iris-virginica
147	6.5	3.0	5.2	2.0	Iris-virginica
148	6.2	3.4	5.4	2.3	Iris-virginica

7. Column cleanup



8. Showing the unique data of a specific column.

```
print("Species")
print(iris['species'].unique())

Species
['Iris-setosa' 'Iris-versicolor' 'Iris-virginica']
```

9. Showing the data frame slicing.

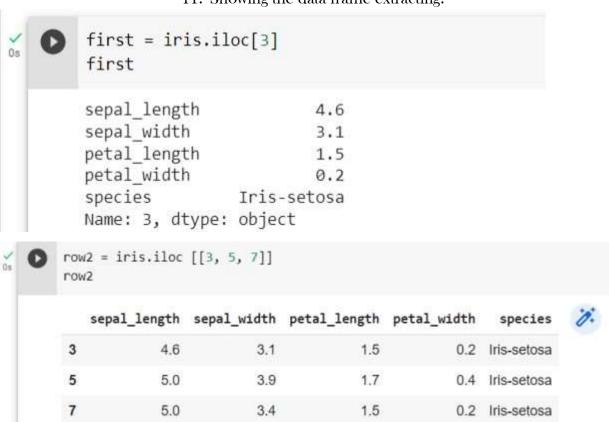
0	iris1=iris.iloc[0:7] iris1										
	se	pal_length	sepal_width	petal_length	petal_width	species	%				
	0	5.0	3.5	1.4	0.2	Iris-setosa					
	1	4.9	3.0	1.4	0.2	Iris-setosa					
	2	4.7	3.2	1.3	0.2	Iris-setosa					
	3	4.6	3.1	1.5	0.2	Iris-setosa					
	4	5.0	3.6	1.4	0.2	Iris-setosa					
	5	5.0	3.9	1.7	0.4	Iris-setosa					
	6	4.6	3.4	1.4	0.3	Iris-setosa					

10. Showing the data frame slicing.

	sepal_	length	sepal_width	petal_length	petal_width	0
	0	5.0	3.5	1.4	0.2	
	1	4.9	3.0	1.4	0.2	
	2	4.7	3.2	1.3	0.2	
	3	4.6	3.1	1.5	0.2	
	4	5.0	3.6	1.4	0.2	
	***	5923		155	255	
1	45	5.0	3.0	5.2	2.3	
1	46	5.0	2.5	5.0	1.9	
1	47	5.0	3.0	5.2	2.0	
1	48	5.0	3.4	5.4	2.3	
1	49	5.0	3.0	5.1	1.8	



11. Showing the data frame extracting.



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Assignment 02

"Data Mining Lab" CSE-476

Submitted by

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> Sec: 03 Intake: 41

Submitted to

Khan Md. Hasib

Assistant Professor

Department of Computer Science & Engineering

What are the differences between the following data sets?

- 1- Contact Lens data: http://archive.ics.uci.edu/ml/datasets/Lenses
- 2- 2- Iris data: http://archive.ics.uci.edu/ml/datasets/Iris From the following algorithms which one is expected to perform best on the Contact Lens data? Implement those on the Contact Lens data→ K-Nearest Neighbors Decision Tree Neural Networks

Ans:

The Contact Lens data set is a collection of data related to contact lens usage compiled from a survey of 24 participants. The data set consists of four attributes: age, spectacle prescription, astigmatism, and tear production rate. The data is presented in a commaseparated values (CSV) file format, containing a total of 24 records with no missing values.

The Iris data set is a collection of data related to three species of irises compiled from measurements of 50 samples from each species. The data set consists of five attributes: sepal length and width, petal length and width, and species. The data is presented in a comma-separated values (CSV) file format, containing a total of 150 records with no missing values.

The primary difference between these two data sets is the type of data being recorded and the number of attributes and records in each data set. The Contact Lens data set contains four continuous numerical attributes and 24 records, while the Iris data set contains five continuous numerical attributes and 150 records.

From the algorithms mentioned, K-Nearest Neighbors is expected to perform best on the Contact Lens data. K-Nearest Neighbors is a supervised learning algorithm which searches for the most similar data points in a dataset and uses them to classify new data points. K-Nearest Neighbors is particularly suited for smaller datasets with a limited number of attributes, such as the Contact Lens data set, since it is relatively easy to search for similar data points in a smaller dataset.

Decision Tree is another supervised learning algorithm which uses a tree structure to classify data points. This algorithm is suitable for datasets with a limited number of attributes, such as the Contact Lens data set, since it can easily determine which attribute is most relevant for classification.

Neural Networks are a type of machine learning algorithm which use a network of artificial neurons to classify data points. Neural Networks are better suited for larger datasets with a large number of attributes, such as the Iris data set, since they can learn complex patterns in the data and can be used to classify data points with a high degree of accuracy.

Upload the dataset and assign column names and showing the top 5 values

<pre>data = pd.read_csv('/content/drive/MyDrive/Colab Notebooks/lenses.data',sep='\s+</pre>	,header=None)
data.rename(columns={0:'index',1:'age',2:'spectacle prescription',3:'astigmatic'	, 4:'tear production rate',5:'lenses'}, inplace=True)
data.head(5)	

	index	age	spectacle prescription	astigmatic	tear production rate	lenses
0	1	1	1	1	1	3
1	2	1	Ĭ	1	2	2
2	3	1	1	2	1	3
3	4	1	1	2	2	1
4	5	1	2	1	1	3

1. Splitting the data into train & test data

```
X = data.drop(["lenses","index"], axis=1).values
Y = data["lenses"].values
X_train, X_test, Y_train, Y_test = train_test_split(X, Y, test_size=0.3, random_state=1)
X_train.shape
X train
array([[1, 1, 2, 1],
       [3, 1, 2, 2],
       [1, 2, 2, 1],
       [1, 2, 2, 2],
       [3, 2, 1, 2],
       [1, 1, 1, 2],
       [3, 1, 1, 1],
       [1, 1, 1, 1],
       [2, 2, 2, 2],
       [3, 2, 2, 2],
       [3, 2, 2, 1],
       [2, 1, 1, 2],
       [2, 1, 1, 1],
       [2, 2, 1, 1],
       [2, 1, 2, 2],
       [1, 2, 1, 2]])
```

2. Applying the Decision Tree to the lens dataset

```
from sklearn.tree import DecisionTreeClassifier

tree = DecisionTreeClassifier(criterion="gini")
tree.fit(X_train, Y_train)

y_pred_train = tree.predict(X_train)
y_pred = tree.predict(X_test)

accuracy_train = accuracy_score(Y_train, y_pred_train)
accuracy_test = accuracy_score(Y_test, y_pred)

print("Training Accurecy is %.2f TEST=%.2f" % (accuracy_train*100,accuracy_test*100))
```

Training Accurecy is 100.00 TEST=87.50

3. After the training, we got the training Accuracy = 100% & testing accuracy = 87%

```
from sklearn.tree import DecisionTreeClassifier
tree = DecisionTreeClassifier(criterion="gini")
tree.fit(X_train, Y_train)
y pred train = tree.predict(X train)
y_pred = tree.predict(X_test)
accuracy_train = accuracy_score(Y_train, y_pred_train)
accuracy_test = accuracy_score(Y_test, y_pred)
print("Training Accurecy is %.2f TEST=%.2f" % (accuracy_train*100,accuracy_test*100))
```

Training Accurecy is 100.00 TEST=87.50

Applying K-Nearest Neighbors

1. Importing the KNeighborsClassifier library & also defining the k-neighbors model.

```
[8] from sklearn.neighbors import KNeighborsClassifier
    knn = KNeighborsClassifier(n neighbors=3)
```

2. Fitting the dataset in the KNN Model.

```
[17] knn.fit(X train, Y train)
     KNeighborsClassifier(n neighbors=3)
```

3. Storing the predicted values and here we got an accuracy of 87%

```
[21] prediction = []
    for i in range(8):
        p = knn.predict(X_test[i].reshape(1,-1))
        prediction.append(p[0])
(Y_test[:30] == prediction).sum()/len(prediction)
0.875
```

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Assignment 03

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Submitted by

Habibullah ID: 18192103080

Sec: 03 Intake: 41

Submitted to

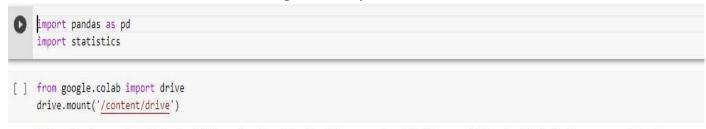
Khan Md. Hasib

Assistant Professor

Department of Computer Science & Engineering

01.Apply calculating mathematical statistics techniques (such as: mean -average value, median - middle value, median - middle value) in the following dataset https://www.kaggle.com/datasets/muthuj7/weather-dataset

1.Import library



Drive already mounted at /content/drive; to attempt to forcibly remount, call drive.mount("/content/drive", force_remount=True).

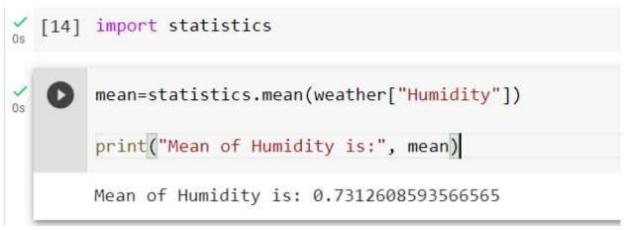
2. Upload the dataset & Viewing the data

Daily Summ	Pressure (millibars)	Loud Cover	Visibility (km)	Wind Bearing (degrees)	Wind Speed (km/h)	Humidity	Apparent Temperature (C)	Temperature (C)	Precip Type	Summary	Formatted Date	
Partly cloudy throughout the	1015.13	0.0	15.8263	251.0	14.1197	0.89	7.388889	9.472222	rain	Partly Cloudy	2006-04-01 00:00:00.000 +0200	0
Partly cloudy throughout the	1015.63	0.0	15.8263	259.0	14.2646	0.86	7.227778	9.355556	rain	Partly Cloudy	2006-04-01 01:00:00.000 +0200	1
Partly cloudy throughout the	1015.94	0.0	14.9569	204.0	3.9284	0.89	9.377778	9.377778	rain	Mostly Cloudy	2006-04-01 02:00:00.000 +0200	2
Partly cloudy throughout the	1016.41	0.0	15.8263	269.0	14.1036	0.83	5.944444	8.288889	rain	Partly Cloudy	2006-04-01 03:00:00.000 +0200	3
Partly cloudy throughout the	1016.51	0.0	15.8263	259.0	11.0446	0.83	6.977778	8.755556	rain	Mostly Cloudy	2006-04-01 04:00:00.000 +0200	4
		or.	***	***		144	or.	16	-			
Partly cloudy starting in morn	1014.36	0.0	16.1000	31.0	10.9963	0.43	26.016667	26.016667	rain	Partly Cloudy	2016-09-09 19:00:00.000 +0200	448
Partly cloudy starting in morn	1015.16	0.0	15.5526	20.0	10.0947	0.48	24.583333	24.583333	rain	Partly Cloudy	2016-09-09 20:00:00.000 +0200	6449
Partly cloudy starting in morn	1015.66	0.0	16.1000	30.0	8.9838	0.56	22.038889	22.038889	rain	Partly Cloudy	2016-09-09 21:00:00.000 +0200	6450
Partly cloudy starting in morn	1015.95	0.0	16.1000	20.0	10.5294	0.60	21.522222	21.522222	rain	Partly Cloudy	2016-09-09 22:00:00.000 +0200	3451
Partly cloudy starting in morn	1016.16	0.0	15.5204	39.0	5.8765	0.61	20.438889	20.438889	rain	Partly Cloudy	2016-09-09 23:00:00.000 +0200	3452

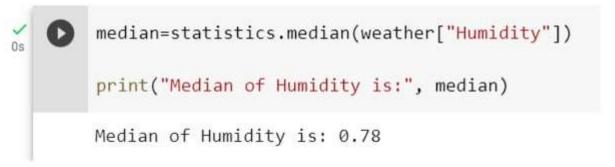
3. View the top 10 rows of the dataset.

weather.head(5)													
	Formatted Date	Summary	Precip Type	Temperature (C)	Apparent Temperature (C)	Humidity	Wind Speed (km/h)	Wind Bearing (degrees)	Visibility (km)	Loud Cover	Pressure (millibars)	Daily Summary	
0 2006-	04-01 00:00:00.000 +0200	Partly Cloudy	rain	9.472222	7.388889	0.89	14.1197	251.0	15.8263	0.0	1015.13	Partly cloudy throughout the day.	
1 2006-	04-01 01:00:00.000 +0200	Partly Cloudy	rain	9.355556	7.227778	0.86	14.2646	259.0	15.8263	0.0	1015.63	Partly cloudy throughout the day.	
2006-	04-01 02:00:00.000 +0200	Mostly Cloudy	rain	9.377778	9.377778	0.89	3.9284	204.0	14.9569	0.0	1015.94	Partly cloudy throughout the day	
2006-	04-01 03:00:00.000 +0200	Partly Cloudy	rain	8.288889	5.944444	0.83	14.1036	269.0	15.8263	0.0	1016.41	Partly cloudy throughout the day	
4 2006-	04-01 04:00:00.000 +0200	Mostly Cloudy	rain	8.755556	6.977778	0.83	11.0446	259.0	15.8263	0.0	1016.51	Partly cloudy throughout the day.	

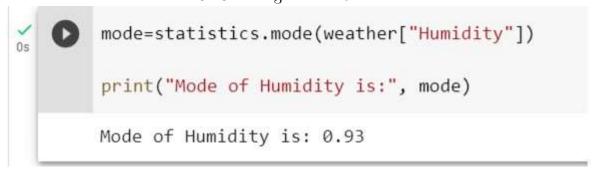
4. Showing the mean value of the Humidity Column



5. Showing the median value



6. Showing the mode value



7. Showing the Standard deviation value

```
stdev=statistics.stdev(weather["Humidity"])

print("Standard deviation of Humidity is:", stdev)

Standard deviation of Humidity is: 0.19565322439944888
```