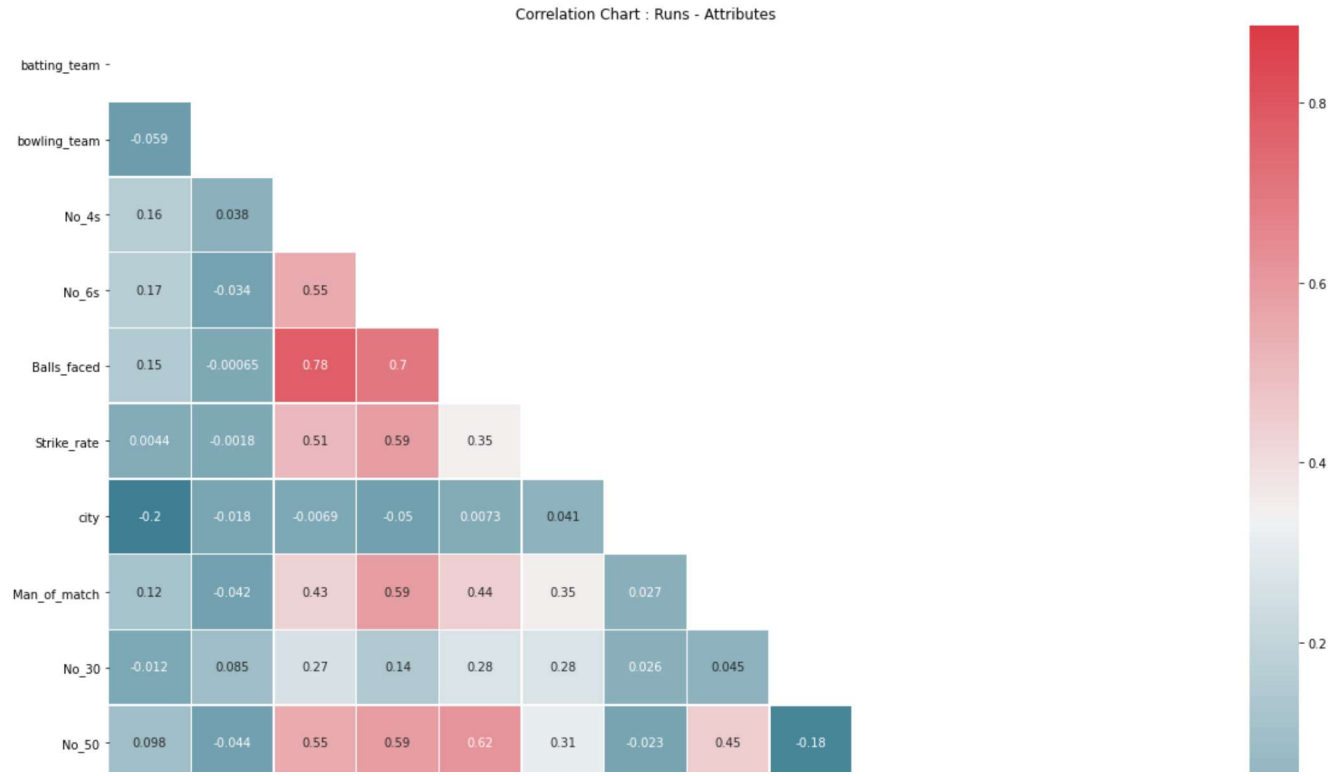
```
import pandas as pd
import numpy as np
import matplotlib.pyplot as plt
import seaborn as sns
from sklearn import preprocessing


df_bat = pd.read_csv('/content/drive/MyDrive/Sports Analytics_Biswas/bat_train_test_dataset.c
df_bat.head()
```

	Unnamed: 0	id	Runs_scored	batting_team	bowling_team	No_4s	No_6s	Balls_faced
0	1	392184	10	Kolkata Knight Riders	Deccan Chargers	1	1	12
1	2	392186	44	Kolkata Knight Riders	Kings XI Punjab	2	4	29
2	3	392190	41	Kolkata Knight Riders	Rajasthan Royals	2	4	38
3	4	392197	12	Kolkata Knight Riders	Mumbai Indians	0	1	12
4	5	392199	40	Kolkata Knight Riders	Royal Challengers Bangalore	6	0	38

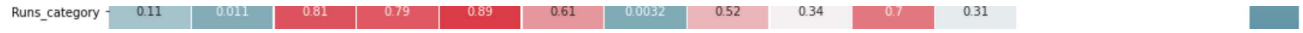
```
df_bat= df_bat.drop(['Unnamed: 0','Runs_scored','id'],axis = 1)


from sklearn.preprocessing import LabelEncoder

def encode(Player,col1,col2,col3,col4):
    le = LabelEncoder()
    Player[col1] = le.fit_transform(Player[col1])
    Player[col2] = le.fit_transform(Player[col2])
    Player[col3] = le.fit_transform(Player[col3])
    Player[col4] = le.fit_transform(Player[col4])
encode(df_bat,'bowling_team','city','Runs_category','batting_team')
df_bat
```

	batting_team	bowling_team	No_4s	No_6s	Balls_faced	Strike_rate	city	Man_of_m
0	2	2	1	1	12	83.3	6	
1	2	5	2	4	29	151.7	13	
2	2	10	2	4	38	107.9	6	
3	2	8	0	1	12	100.0	25	
4	2	13	6	0	38	105.3	13	
...	...	...	...	...	...	...	...	
554	2	11	0	0	9	44.4	22	
555	2	13	0	0	6	0.0	3	
556	2	5	0	0	3	66.7	8	
557	2	8	0	3	9	222.2	22	

```
# Check correlation

from matplotlib import pyplot as plt
import seaborn as sns


corr_df_bat =df_bat.corr()
# Drop self-correlations
dropSelf = np.zeros_like(corr_df_bat)
dropSelf[np.triu_indices_from(dropSelf)] = True
# Generate Color Map
colormap = sns.diverging_palette(220, 10, as_cmap=True)
fig, ax = plt.subplots(figsize=(20, 15))
sns.heatmap(corr_df_bat,cmap=colormap,linewidths=.5, annot=True, mask=dropSelf)
plt.title('Correlation Chart : Runs - Attributes')
plt.show()
```




```
target=df_bat['Runs_category']
train=df_bat.drop('Runs_category', axis=1)
```

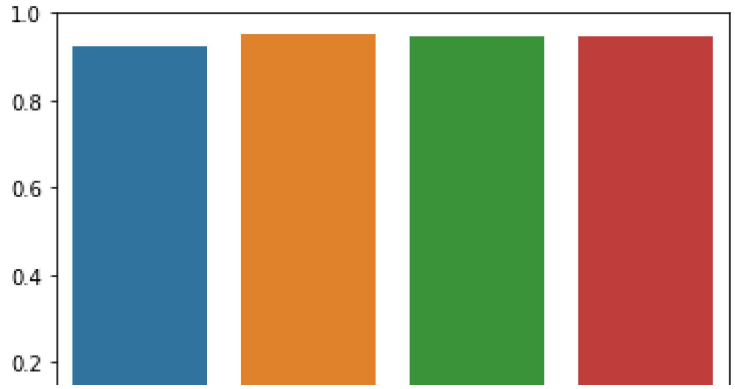



```
#importing libraries for classifiers
from sklearn.tree import DecisionTreeClassifier
from sklearn.naive_bayes import GaussianNB
from sklearn.ensemble import RandomForestClassifier
from sklearn import svm

#importing libraries for precision, accuracy score, barplot and table for comparision
from sklearn.metrics import precision_score
from sklearn.metrics import accuracy_score
from seaborn import barplot
from tabulate import tabulate
```

```
# Built a function to construct and compare different calssifiers
def train_test_fun (X_train, X_test, y_train, y_test):
  ML_models = dict()  #keeping record of accuracy of all models
  # 1. Decison Tree
  DT_model=DecisionTreeClassifier(criterion='gini', splitter='best',
                            max_depth=16, min_samples_split=2,
                            min_samples_leaf=1) # model
  DT_model.fit(X_train,y_train)  #training the model
  y_pred_DT=DT_model.predict(X_test) #testing the model
  DT_accuracy=accuracy_score(y_test,y_pred_DT) # accuracy of model
  DT_precision=precision_score(y_test,y_pred_DT,average='weighted') # Weighted precision of m
  ML_models["Decision Tree"] = DT_accuracy  #updating dictionary
```

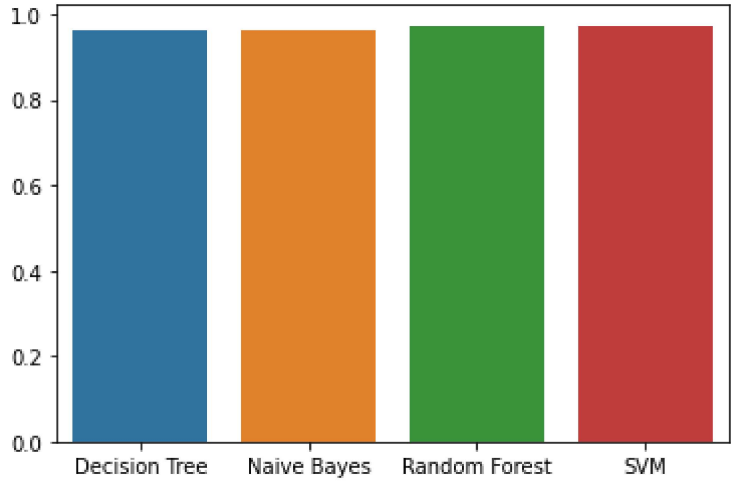
```
  # 2. Naive Bayes
  NB_model=GaussianNB() # model
  NB_model.fit(X_train,y_train) #training the model
  y_pred_NB=NB_model.predict(X_test) #testing the model
  NB_accuracy=accuracy_score(y_test,y_pred_NB)  # accuracy of model
  NB_precision=precision_score(y_test,y_pred_NB,average='weighted')  # Weighted precision of
  ML_models["Naive Bayes"] = NB_accuracy #updating dictionary

  # 3. Random Forest
  RF_model=RandomForestClassifier(n_estimators=50) #model
  RF_model.fit(X_train,y_train) #training model
  y_pred_RF=RF_model.predict(X_test) #testing model
  RF_accuracy=accuracy_score(y_test,y_pred_RF) # accuracy of model
  RF_precision=precision_score(y_test,y_pred_RF,average='weighted') # Weighted precision of m
  ML_models["Random Forest"] = RF_accuracy #updating dictionary

  # 4. SVM
  SVM_model = svm.SVC(kernel='linear') # Linear Kernel model
  SVM_model.fit(X_train, y_train) #training model
  y_pred_SVM = SVM_model.predict(X_test) #testing model
  SVM_accuracy=accuracy_score(y_test,y_pred_SVM)
  SVM_precision=precision_score(y_test,y_pred_SVM,average='weighted')
  ML_models["SVM"] = RF_accuracy #updating dictionary

  #Table for comparision
  print(tabulate([['Decision Tree', DT_accuracy,DT_precision], ['Naive Bayes', NB_accuracy,NE
                  ['Random Forest', RF_accuracy,RF_precision],['SVM', SVM_accuracy,SVM_precis
                 headers=['Model','Accuracy','Precision']))

  #Barplot for Accuracy of models
  names_models = list(ML_models.keys())
  accuracy_models = list(map(float, ML_models.values()))


  return barplot(names_models, accuracy_models)




from sklearn.model_selection import train_test_split

# train dataset 70% , Test dataset 30%
X_train, X_test, y_train, y_test = train_test_split(train, target, test_size = 0.30, random_s
train_test_fun (X_train, X_test, y_train, y_test)
```

```
Model            Accuracy    Precision
-------------  ----------  -----------
Decision Tree    0.922619     0.920722
Naive Bayes      0.952381     0.954609
Random Forest    0.946429     0.947499
SVM              0.916667     0.922091
/usr/local/lib/python3.7/dist-packages/seaborn/_decorators.py:43: FutureWarning: Pass t
  FutureWarning
<matplotlib.axes._subplots.AxesSubplot at 0x7fb34f59fd10>
```



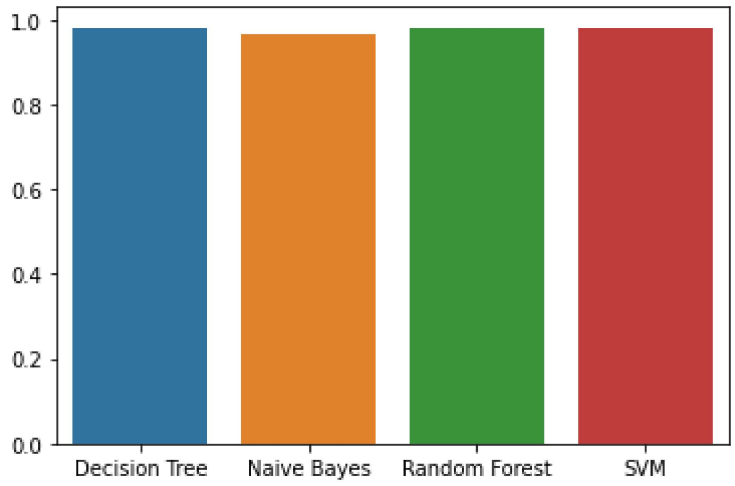

```
# train dataset 80% , Test dataset 20%
X_train, X_test, y_train, y_test = train_test_split(train, target, test_size = 0.20, random_s
train_test_fun (X_train, X_test, y_train, y_test)
```

```
Model            Accuracy    Precision
-------------  ----------  -----------
Decision Tree    0.964286     0.96668
Naive Bayes      0.964286     0.96627
Random Forest    0.973214     0.975416
SVM              0.955357     0.957061
/usr/local/lib/python3.7/dist-packages/seaborn/_decorators.py:43: FutureWarning: Pass t
  FutureWarning
<matplotlib.axes._subplots.AxesSubplot at 0x7fb34f52ed10>
```




```
# train dataset 90% , Test dataset 10%
X_train, X_test, y_train, y_test = train_test_split(train, target, test_size = 0.10, random_s
train_test_fun  (X_train, X_test, y_train, y_test)
```

```
Model            Accuracy    Precision
-------------  ----------  -----------
Decision Tree    0.982143     0.982919
Naive Bayes      0.964286     0.968038
Random Forest    0.982143     0.982919
SVM              0.946429     0.949405
/usr/local/lib/python3.7/dist-packages/seaborn/_decorators.py:43: FutureWarning: Pass t
  FutureWarning
<matplotlib.axes._subplots.AxesSubplot at 0x7fb34f4a8710>
```



Predicting Runs scored by Pollard ,Watson and Yuvraj

```
df_Pollard_Raw = pd.read_csv('/content/drive/MyDrive/Sports Analytics_Biswas/Pollard_pred_dat
df_Pollard_bat= df_Pollard_Raw.drop(['Unnamed: 0','id','Runs_scored','Runs_category'],axis =
df_Pollard_bat=df_Pollard_bat.sample(n=10, random_state=6)

df_Watson_Raw = pd.read_csv('/content/drive/MyDrive/Sports Analytics_Biswas/Watson_pred_data.
df_Watson_bat= df_Watson_Raw.drop(['Unnamed: 0','id','Runs_scored','Runs_category'],axis = 1)
df_Watson_bat=df_Watson_bat.sample(n=10, random_state=6)

df_Yuvraj_Raw= pd.read_csv('/content/drive/MyDrive/Sports Analytics_Biswas/Yuvraj_pred_data.c
df_Yuvraj_bat= df_Yuvraj_Raw.drop(['Unnamed: 0','id','Runs_scored','Runs_category'],axis = 1)
df_Yuvraj_bat=df_Yuvraj_bat.sample(n=10, random_state=6)

df_Yusuf_Raw= pd.read_csv('/content/drive/MyDrive/Sports Analytics_Biswas/Yusuf_pred_data.csv
df_Yusuf_bat= df_Yusuf_Raw.drop(['Unnamed: 0','id','Runs_scored','Runs_category'],axis = 1)
df_Yusuf_bat=df_Yusuf_bat.sample(n=10, random_state=6)
```

```
def encode(Player,col1,col2,col3):
    le = LabelEncoder()
    Player[col1] = le.fit_transform(Player[col1])
    Player[col2] = le.fit_transform(Player[col2])
    Player[col3] = le.fit_transform(Player[col3])
encode(df_Pollard_bat,'bowling_team','city','batting_team')
```

```
encode(df_watson_bat, 'bowling_team' , 'city' , 'batting_team' )
encode(df_Yuvraj_bat,'bowling_team','city','batting_team')
encode(df_Yusuf_bat,'bowling_team','city','batting_team')


#  Random Forest - most accurate model
X_train, X_test, y_train, y_test = train_test_split(train, target, test_size = 0.10, random_s
RF_model=RandomForestClassifier(n_estimators=50) #model
RF_model.fit(X_train,y_train) #training model


     RandomForestClassifier(bootstrap=True, ccp_alpha=0.0, class_weight=None,
                            criterion='gini', max_depth=None, max_features='auto',
                            max_leaf_nodes=None, max_samples=None,
                            min_impurity_decrease=0.0, min_impurity_split=None,
                            min_samples_leaf=1, min_samples_split=2,
                            min_weight_fraction_leaf=0.0, n_estimators=50,
                            n_jobs=None, oob_score=False, random_state=None,
                            verbose=0, warm_start=False)


from collections import Counter
import numpy as np

#Runs Prediction

Runs_Pollard=RF_model.predict(df_Pollard_bat)
Runs_Watson=RF_model.predict(df_Watson_bat)
Runs_Yuvraj=RF_model.predict(df_Yuvraj_bat)
Runs_Yusuf=RF_model.predict(df_Yusuf_bat)


Predicted_Runs = {'Player':['Watson','Pollard', 'Yuvraj','Yusuf' ],
        'Predicted_runs(10_matches)':[sum(Runs_Watson),sum(Runs_Pollard), sum(Runs_Yuvraj), s

# Create DataFrame
Predicted_Runs_df = pd.DataFrame(Predicted_Runs)
Predicted_Runs_df
```

	Player	Predicted_runs(10_matches)
0	Watson	18
1	Pollard	13
2	Yuvraj	9
3	Yusuf	6

Bowling Analysis and Prediction

```
df_bowl = pd.read_csv('/content/drive/MyDrive/Sports Analytics_Biswas/train_test_dataset_bowl
df_bowl
```

df_bowl

	Unnamed: 0	id	Wickets_taken	Overs_bowled	batting_team	bowling_team	Total_r
0	1	392184	0	1	Deccan Chargers	Kolkata Knight Riders	
1	2	392186	0	1	Kings XI Punjab	Kolkata Knight Riders	
2	3	392190	0	4	Rajasthan Royals	Kolkata Knight Riders	
3	4	392197	0	2	Mumbai Indians	Kolkata Knight Riders	
4	5	392199	0	4	Royal Challengers Bangalore	Kolkata Knight Riders	
...	...	...	...	...	...	...	
280	281	598034	0	2	Chennai Super Kings	Kolkata Knight Riders	
281	282	598040	0	1	Delhi Daredevils	Kolkata Knight Riders	
282	283	598057	0	1	Royal Challengers Bangalore	Kolkata Knight Riders	
283	284	598069	0	4	Sunrisers Hyderabad	Kolkata Knight Riders	
284	285	734009	0	1	Mumbai Indians	Kolkata Knight Riders	

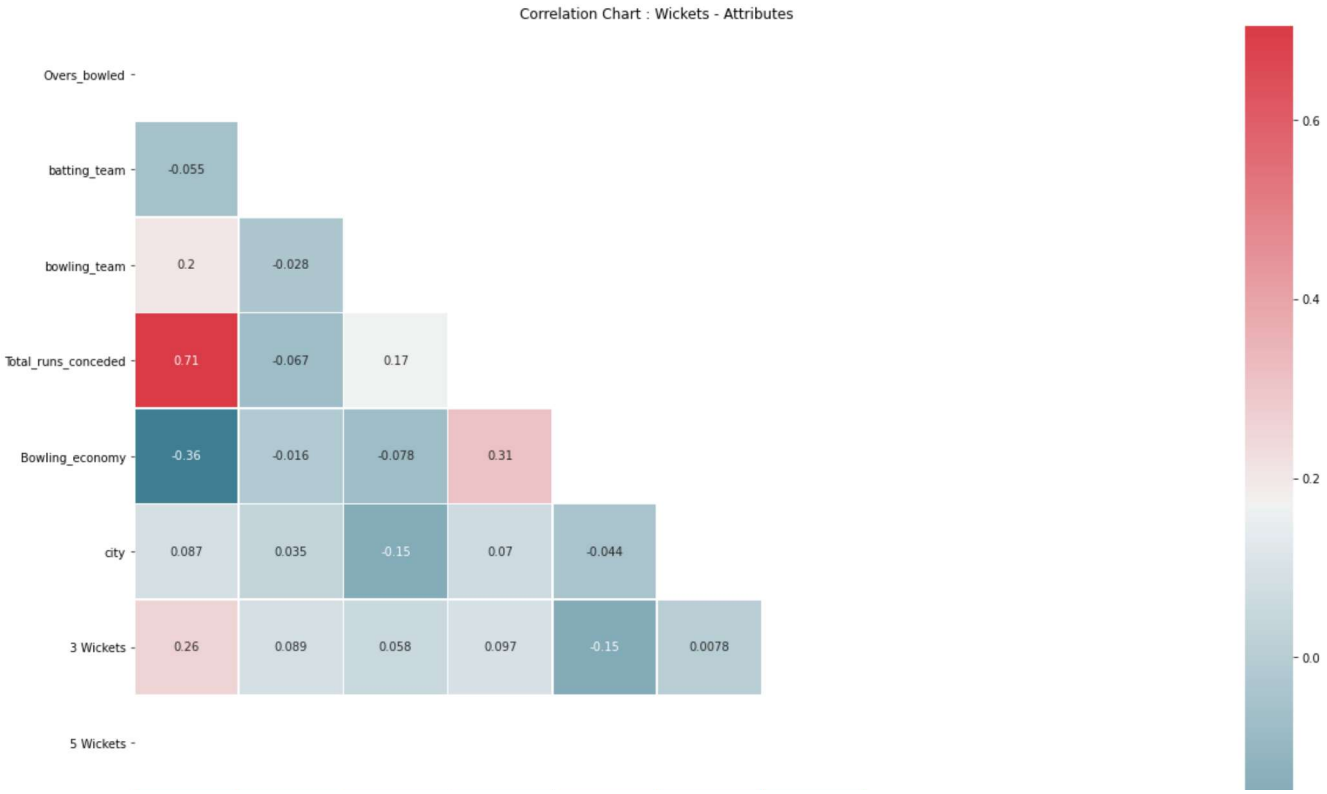
285 rows × 13 columns

```
df_bowl= df_bowl.drop(['Unnamed: 0','id','Wickets_taken'],axis = 1)
df_bowl.head(3)
```

```
def encode(Player,col1,col2,col3,col4):
    le = LabelEncoder()
    Player[col1] = le.fit_transform(Player[col1])
    Player[col2] = le.fit_transform(Player[col2])
    Player[col3] = le.fit_transform(Player[col3])
    Player[col3] = le.fit_transform(Player[col3])
encode(df_bowl,'batting_team','city','bowling_team','Wickets_Category')
df_bowl.head(3)
```

	Overs_bowled	batting_team	bowling_team	Total_runs_conceded	Bowling_economy	city
0	1	1	2	14	14.0	5
1	1	3	2	14	14.0	12
2	4	8	2	20	5.0	5

```
from matplotlib import pyplot as plt
import seaborn as sns
corr_df_bowl =df_bowl.corr()
# Drop self-correlations
dropSelf = np.zeros_like(corr_df_bowl)
dropSelf[np.triu_indices_from(dropSelf)] = True
# Generate Color Map
colormap = sns.diverging_palette(220, 10, as_cmap=True)
fig, ax = plt.subplots(figsize=(20, 15))
sns.heatmap(corr_df_bowl,cmap=colormap,linewidths=.5, annot=True, mask=dropSelf)
plt.title('Correlation Chart : Wickets - Attributes')
plt.show()
```



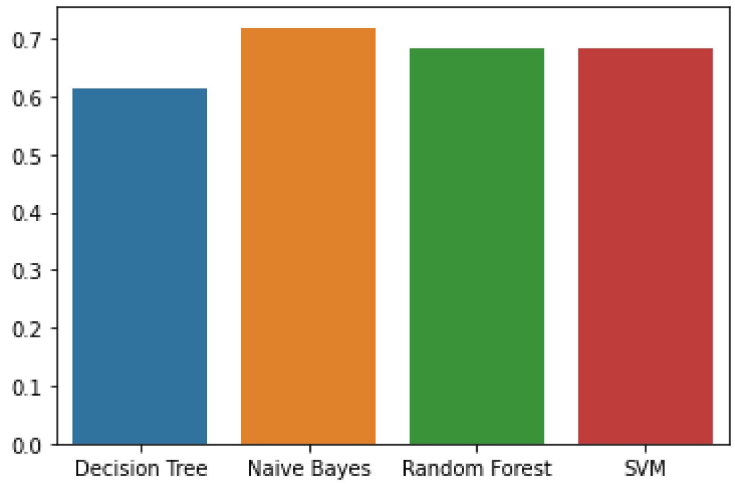

```
target=df_bowl['Wickets_Category']
train=df_bowl.drop('Wickets_Category', axis=1)
```

```
# train dataset 70% , Test dataset 30%
X_train, X_test, y_train, y_test = train_test_split(train, target, test_size = 0.30, random_s
train_test_fun  (X_train, X_test, y_train, y_test)
```

```
      Model            Accuracy    Precision
      -------------  ----------  -----------
      Decision Tree    0.662791     0.668227
      Naive Bayes      0.686047     0.683561
      Random Forest    0.709302     0.699336
      SVM              0.686047     0.670516
      /usr/local/lib/python3.7/dist-packages/sklearn/metrics/_classification.py:1272: Undefin
```

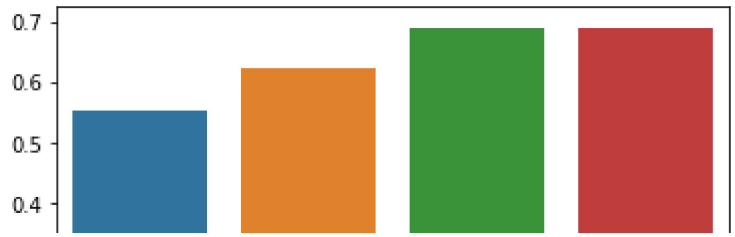
```
# train dataset 80% , Test dataset 20%
X_train, X_test, y_train, y_test = train_test_split(train, target, test_size = 0.20, random_s
train_test_fun  (X_train, X_test, y_train, y_test)
```

```
      Model            Accuracy    Precision
      -------------  ----------  -----------
      Decision Tree    0.614035     0.612121
      Naive Bayes      0.719298     0.704763
      Random Forest    0.684211     0.689026
      SVM              0.719298     0.739901
      /usr/local/lib/python3.7/dist-packages/sklearn/metrics/_classification.py:1272: Undefin
        _warn_prf(average, modifier, msg_start, len(result))
      /usr/local/lib/python3.7/dist-packages/sklearn/metrics/_classification.py:1272: Undefin
        _warn_prf(average, modifier, msg_start, len(result))
      /usr/local/lib/python3.7/dist-packages/seaborn/_decorators.py:43: FutureWarning: Pass t
        FutureWarning
      <matplotlib.axes._subplots.AxesSubplot at 0x7fb34f269850>
```




```
# train dataset 90% , Test dataset 10%
X_train, X_test, y_train, y_test = train_test_split(train, target, test_size = 0.10, random_s
train_test_fun  (X_train, X_test, y_train, y_test)
```

```
Model            Accuracy    Precision
-------------  ----------  -----------
Decision Tree    0.551724     0.554377
Naive Bayes      0.62069      0.702821
Random Forest    0.689655     0.702821
SVM              0.724138     0.778736
/usr/local/lib/python3.7/dist-packages/seaborn/_decorators.py:43: FutureWarning: Pass t
  FutureWarning
<matplotlib.axes._subplots.AxesSubplot at 0x7fb34f1f12d0>
```



Predicting Wickets taken by Pollard ,Watson and Yuvraj


```
df_Pollard_RawB = pd.read_csv('/content/drive/MyDrive/Sports Analytics_Biswas/Pollard_pred_da
df_Pollard_B= df_Pollard_RawB.drop(['Unnamed: 0','id','Wickets_taken','Wickets_Category'],axi
df_Pollard_B=df_Pollard_B.sample(n=10,random_state=2)
df_Pollard_B
```

```
df_Watson_RawB = pd.read_csv('/content/drive/MyDrive/Sports Analytics_Biswas/Watson_pred_data
df_Watson_B= df_Watson_RawB.drop(['Unnamed: 0','id','Wickets_taken','Wickets_Category'],axis
df_Watson_B=df_Watson_B.sample(n=10,random_state=2)
df_Watson_B
```

```
df_Yuvraj_RawB= pd.read_csv('/content/drive/MyDrive/Sports Analytics_Biswas/Yuvraj_pred_data_
df_Yuvraj_B= df_Yuvraj_RawB.drop(['Unnamed: 0','id','Wickets_taken','Wickets_Category'],axis
df_Yuvraj_B=df_Yuvraj_B.sample(n=10,random_state=2)
df_Yuvraj_B
```

```
df_Yusuf_RawB= pd.read_csv('/content/drive/MyDrive/Sports Analytics_Biswas/Yusuf_pred_data_bc
df_Yusuf_B= df_Yusuf_RawB.drop(['Unnamed: 0','id','Wickets_taken','Wickets_Category'],axis =
df_Yusuf_B=df_Yusuf_B.sample(n=10,random_state=2)
df_Yusuf_B
```

	Overs_bowled	batting_team	bowling_team	Total_runs_conceded	Bowling_economy	
11	1	Sunrisers Hyderabad	Kolkata Knight Riders	17	17.0	
4	1	Sunrisers Hyderabad	Kolkata Knight Riders	19	19.0	
5	1	Kings XI Punjab	Kolkata Knight Riders	6	6.0	
0	4	Royal Challengers Bangalore	Kolkata Knight Riders	43	10.8	
9	1	Gujarat Lions	Kolkata Knight Riders	15	15.0	
3	2	Sunrisers Hyderabad	Kolkata Knight Riders	18	9.0	Vis

```
def encode(Player,col1,col2,col3):
    le = LabelEncoder()
    Player[col1] = le.fit_transform(Player[col1])
    Player[col2] = le.fit_transform(Player[col2])
    Player[col3] = le.fit_transform(Player[col3])
encode(df_Pollard_B,'batting_team','city','bowling_team')
encode(df_Watson_B,'batting_team','city','bowling_team')
encode(df_Yuvraj_B,'batting_team','city','bowling_team')
encode(df_Yusuf_B,'batting_team','city','bowling_team')
```

```
#The model performed best with 90-10 split on SVM with highest accuracy and precision

# train dataset 90% , Test dataset 10%
X_train, X_test, y_train, y_test = train_test_split(train, target, test_size = 0.10, random_s
SVM_model = svm.SVC(kernel='linear') # Linear Kernel model
SVM_model.fit(X_train, y_train) #training model
```

```
SVC(C=1.0, break_ties=False, cache_size=200, class_weight=None, coef0=0.0,
    decision_function_shape='ovr', degree=3, gamma='scale', kernel='linear',
    max_iter=-1, probability=False, random_state=None, shrinking=True,
    tol=0.001, verbose=False)
```

```
Wickets_Pollard=SVM_model.predict(df_Pollard_B)
Wickets_Watson=SVM_model.predict(df_Watson_B)
Wickets_Yuvraj=SVM_model.predict(df_Yuvraj_B)
Wickets_Yusuf=SVM_model.predict(df_Yusuf_B)
```

```
Predicted_Wickets = {'Player':['Pollard', 'Watson', 'Yuvraj', 'Yusuf'],
        'Predicted_Wickets(10_matches)':[sum(Wickets_Pollard), sum(Wickets_Watson),sum(Wicket

# Create DataFrame
Predicted_Wickets_df = pd.DataFrame(Predicted_Wickets)
Predicted_Wickets_df
```

	Player	Predicted_Wickets(10_matches)
0	Pollard	19
1	Watson	22
2	Yuvraj	15
3	Yusuf	17

Final Table (Runs + Wickets Predictions) in randomly selected 10 matches

```
Final_table=pd.merge(Predicted_Runs_df, Predicted_Wickets_df, on=["Player"])
Final_table
```

	Player	Predicted_runs(10_matches)	Predicted_Wickets(10_matches)
0	Watson	18	22
1	Pollard	13	19
2	Yuvraj	9	15
3	Yusuf	6	17

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