```python
import pandas as pd
import numpy as np
from sklearn.model_selection import train_test_split
from sklearn import linear_model
import matplotlib.pyplot as plt

import seaborn as sns

df = pd.read_csv('Virat.csv', encoding='latin-1')
df.head()
```

```
   Number Format  Inning Position  Score  Balls  Strike Rate
Against  \
0       1    ODI       2        4    107    114    93.859649      Sri
Lanka
1       2    ODI       2        3    102     95   107.368421
Bangladesh
2       3    ODI       2        3    118    121    97.520661
Australia
3       4    ODI       1        3    105    104   100.961539   New
Zealand
4       5    ODI       1        4    100     83   120.481928
Bangladesh

       Venue Host Nation      Series  Year  Team Total  Wickets lost
Not Out  \
0   Kolkata        India    Bilateral  2009         316             3
No
1    Mirpur   Bangladesh   Tri-Series  2010         249             4
Yes
2     Vizag        India    Bilateral  2010         292             5
No
3  Guwahati        India    Bilateral  2010         276            10
No
4    Mirpur   Bangladesh    World Cup  2011         370             4
Yes

  MOTM  Win Captain
0   No  Yes      No
1  Yes  Yes      No
2  Yes  Yes      No
3  Yes  Yes      No
4   No  Yes      No
```

```python
df.columns
```

```
Index(['Number', 'Format', 'Inning', 'Position', 'Score', 'Balls',
       'Strike Rate', 'Against', 'Venue', 'Host Nation', 'Series',
'Year',
       'Team Total', 'Wickets lost', 'Not Out', 'MOTM', 'Win',
```

```
      'Captain'],
      dtype='object')
```

```
df.describe()
```

	Number	Inning	Score	Balls	Strike Rate	Year
count	82.000000	82.000000	82.000000	82.000000	82.000000	82.000000
mean	41.500000	1.670732	130.378049	147.731707	103.825286	2015.865854
std	23.815261	0.667682	35.198078	77.370210	39.533027	3.365629
min	1.000000	1.000000	100.000000	50.000000	34.915254	2009.000000
25%	21.250000	1.000000	107.000000	96.500000	75.630252	2013.000000
50%	41.500000	2.000000	116.500000	119.500000	97.160331	2016.000000
75%	61.750000	2.000000	139.000000	192.500000	121.399552	2018.000000
max	82.000000	4.000000	254.000000	366.000000	226.000000	2023.000000

	Team Total	Wickets lost
count	82.000000	82.000000
mean	335.317073	6.134146
std	117.733102	2.818643
min	166.000000	1.000000
25%	268.500000	4.000000
50%	305.500000	6.000000
75%	360.500000	9.000000
max	687.000000	10.000000

```
df.dtypes
```

```
Number           int64
Format          object
Inning           int64
Position        object
Score            int64
Balls            int64
Strike Rate    float64
Against         object
Venue           object
Host Nation     object
Series          object
Year             int64
Team Total       int64
Wickets lost     int64
```

```
Not Out         object
MOTM            object
Win             object
Captain         object
dtype: object

df.rename(columns = {'Strike Rate' : 'stk', 'Position' :'pos'},
inplace = True)

df.dtypes

Number              int64
Format             object
Inning              int64
pos                object
Score               int64
Balls               int64
stk               float64
Against            object
Venue              object
Host Nation        object
Series             object
Year                int64
Team Total          int64
Wickets lost        int64
Not Out            object
MOTM               object
Win                object
Captain            object
dtype: object

df.info()

<class 'pandas.core.frame.DataFrame'>
RangeIndex: 82 entries, 0 to 81
Data columns (total 18 columns):
 #   Column       Non-Null Count  Dtype
---  ------       --------------  -----
 0   Number       82 non-null     int64
 1   Format       82 non-null     object
 2   Inning       82 non-null     int64
 3   pos          82 non-null     object
 4   Score        82 non-null     int64
 5   Balls        82 non-null     int64
 6   stk          82 non-null     float64
 7   Against      82 non-null     object
 8   Venue        82 non-null     object
 9   Host Nation  82 non-null     object
 10  Series       82 non-null     object
 11  Year         82 non-null     int64
```

```
 12  Team Total    82 non-null     int64
 13  Wickets lost  82 non-null     int64
 14  Not Out       82 non-null     object
 15  MOTM          82 non-null     object
 16  Win           82 non-null     object
 17  Captain       82 non-null     object
dtypes: float64(1), int64(7), object(10)
memory usage: 11.7+ KB

df.isnull().sum()
```

```
Number          0
Format          0
Inning          0
pos             0
Score           0
Balls           0
stk             0
Against         0
Venue           0
Host Nation     0
Series          0
Year            0
Team Total      0
Wickets lost    0
Not Out         0
MOTM            0
Win             0
Captain         0
dtype: int64
```

```
df1 = pd.get_dummies(df,columns = ['Format',
'Against','Venue','Captain', 'MOTM','Win'])
df.drop(['Host Nation', 'Series'], axis = 1)
```

```
    Number Format  Inning   pos  Score  Balls        stk  \
0        1    ODI       2     4    107    114   93.859649
1        2    ODI       2     3    102     95  107.368421
2        3    ODI       2     3    118    121   97.520661
3        4    ODI       1     3    105    104  100.961539
4        5    ODI       1     4    100     83  120.481928
..     ...    ...     ...   ...    ...    ...        ...
77      78    ODI       1     3    113     87  129.885057
78      79    ODI       1     3    166    110  150.909091
79      80   Test       2     4    186    364   51.098901
80      81    T20       2  Open    100     63  158.730159
81      82    T20       1  Open    101     61  165.573770

             Against            Venue  Year  Team Total  Wickets
lost  \
```

```
0                Sri Lanka                    Kolkata  2009          316
3
1               Bangladesh                    Mirpur   2010          249
4
2                Australia                     Vizag   2010          292
5
3              New Zealand                  Guwahati   2010          276
10
4               Bangladesh                    Mirpur   2011          370
4
..                     ...                       ...    ...          ...
...
77               Sri Lanka                  Guwahati   2023          373
7
78               Sri Lanka   Thiruvananthapuram        2023          390
5
79               Australia                 Ahmedabad   2023          571
9
80   Sunrisers Hyderabad                   Hyderabad   2023          187
2
81          Gujarat Titans                 Bengaluru   2023          197
5

    Not Out  MOTM    Win Captain
0        No    No    Yes      No
1       Yes   Yes    Yes      No
2        No   Yes    Yes      No
3        No   Yes    Yes      No
4       Yes    No    Yes      No
..      ...   ...    ...      ...
77       No   Yes    Yes      No
78      Yes   Yes    Yes      No
79       No   Yes  Drawn      No
80       No   Yes    Yes      No
81      Yes    No     No      No

[82 rows x 16 columns]
```

```python
centuries = df.groupby('Format').size()
fig, ax = plt.subplots(figsize = (10,5))
ax.barh(centuries.index, centuries.values)
ax.invert_yaxis()
ax.set_title('Centuries', loc ='left')
plt.show()
```

Centuries
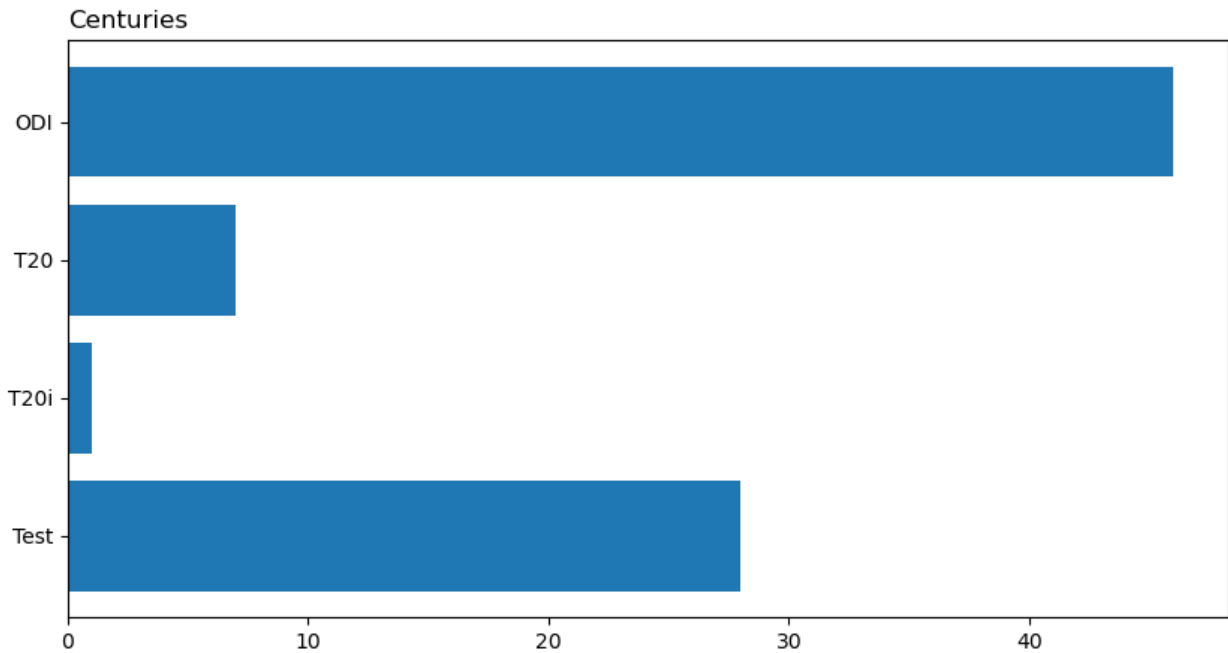

```
df.groupby(['Format', 'Inning']).count()[['Number']]
```

		Number
Format	Inning	
ODI	1	20
	2	26
T20	1	5
	2	2
T20i	1	1
Test	1	8
	2	15
	3	3
	4	2

```
df.groupby(['Against']).count()[['Number']]
```

	Number
Against	
Afghanistan	1
Australia	16
Bangladesh	6
England	8
Gujarat Lions	2
Gujarat Titans	1
Kings XI Punjab	1
Kolkata Knight Riders	1
New Zealand	8
Pakistan	2
Rising Pune Supergiants	1
South Africa	7

```
Sri Lanka                          15
Sunrisers Hyderabad                 1
West Indies                        11
Zimbabwe                            1

centuries=df.groupby(['Against']).count()[['Number']].reset_index()
plt.figure(figsize=(25,15),dpi=300)
sns.barplot(x="Against",y="Number",data=centuries)
plt.show()
```
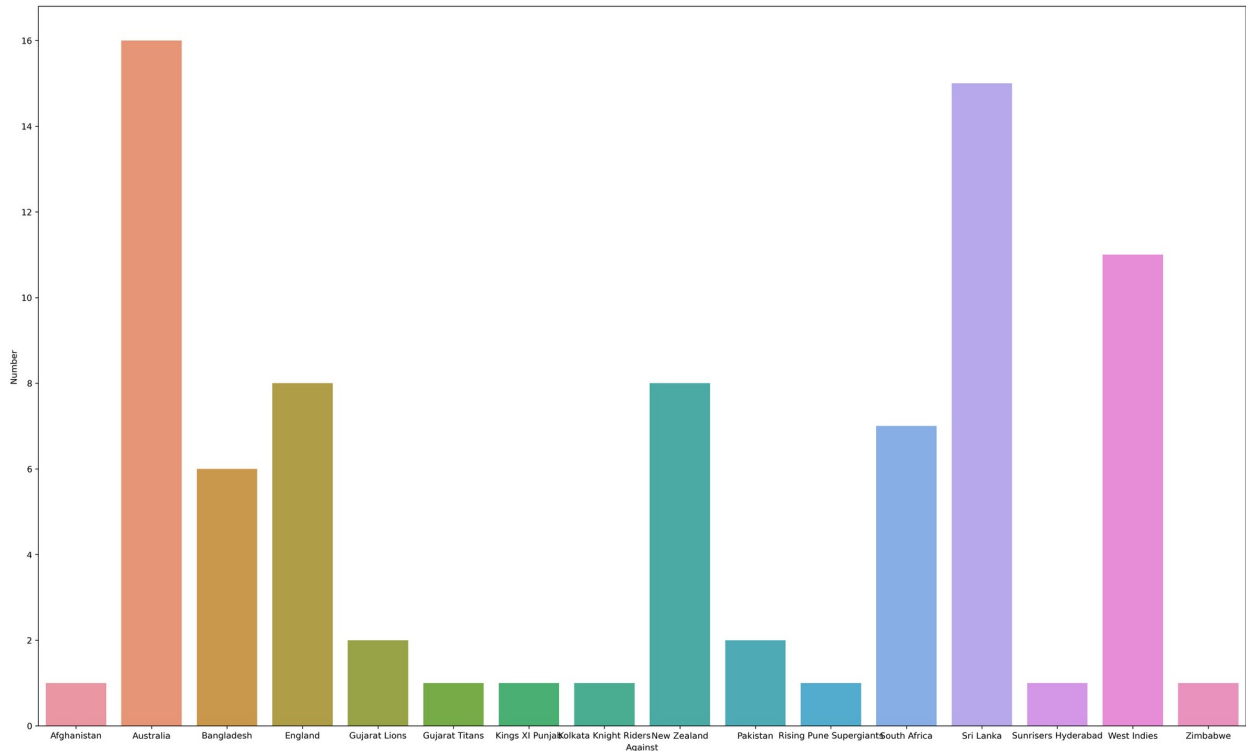


```python
import plotly.express as px
fig = px.bar(df, x='Format', y='stk', color='Against')
fig.update_layout(height=700, width=700, title_text='Comparison of
strike rate in different formats against nations')
fig.show()
```

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```

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fig.update_layout(title_text='Centuries in different venues across
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fig.show()
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```python
print('Average team score in test when Virat scores a double
century',df.query('Score>200')['Team Total'].mean())
print('Average team total when Virat scores a century in
ODI',df[df['Format']=='ODI']['Team Total'].mean())
print('Average team total when Virat scores a century in
T20',df[df['Format']=='T20']['Team Total'].mean())
```

```
Average team score in test when Virat scores a double century
603.6666666666666
```

```
Average team total when Virat scores a century in ODI
299.82608695652175
Average team total when Virat scores a century in T20
204.42857142857142

from sklearn.preprocessing import LabelEncoder
label_encoder = LabelEncoder()
for column in ('Format', 'Against', 'Venue', 'Captain'):
    label_encoder.fit(df[column])
    df[column + '_encoded'] = label_encoder.transform(df[column])

X = df[['Number', 'Balls', 'Team Total', 'Wickets lost']]
Y = df[['Score','stk']]

X_train, X_test, y_train, y_test = train_test_split(X, Y,
test_size=0.2, random_state = 42)

regression = linear_model.LinearRegression()
regression.fit(X_train, y_train)

y_pred = regression.predict(X_test)
y_test = np.array(y_test)

from sklearn.metrics import r2_score
accuracy = r2_score(y_test, y_pred )
plt.plot(y_test,y_pred)
plt.show()
print(accuracy)
```
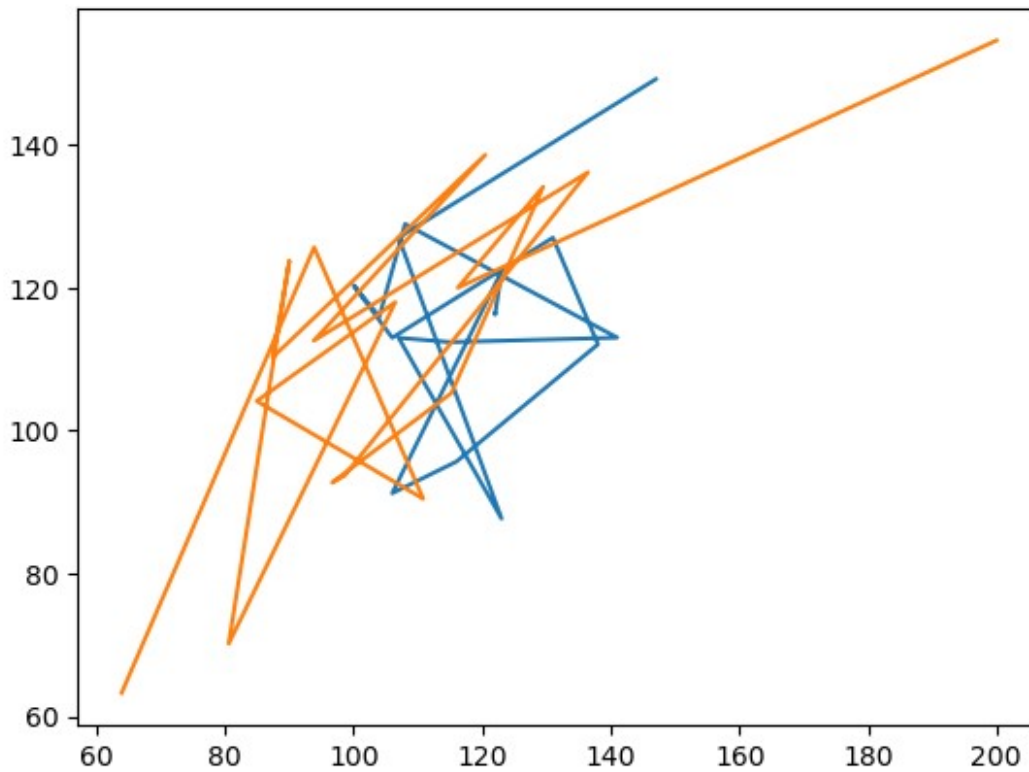
```
0.00193704927351529

print(X_test)

     Number  Balls  Team Total  Wickets lost
30       31    230         475            10
0         1    114         316             3
22       23    111         268            10
31       32    126         300             7
18       19    108         230             4
28       29    175         315            10
10       11    120         304             3
53       54    119         352             8
4         5     83         370             4
12       13    113         314             6
49       50     96         375             5
33       34    140         299             8
68       69    120         250            10
35       36     92         323            10
69       70     95         313             5
45       46    105         356             7
75       76     61         212             2

y_pred_ = regression.predict([[1, 114, 316, 3]])
```

```
/Users/shrinivass/opt/anaconda3/lib/python3.9/site-packages/sklearn/
base.py:450: UserWarning:

X does not have valid feature names, but LinearRegression was fitted
with feature names


y_pred_

array([[127.03145898, 125.6570205 ]])
```

SVM

```
from sklearn.svm import SVC
from sklearn.metrics import accuracy_score, confusion_matrix,
classification_report
from sklearn.preprocessing import StandardScaler
X = df[['Number', 'Balls', 'Team Total', 'Wickets lost']]
Y = df[['Score']]

X_train, X_test, y_train, y_test = train_test_split(X, Y, test_size =
0.2, random_state = 43)

svm_classifier = SVC(kernel = 'linear')
svm_classifier.fit(X_train, y_train)
y_pred = svm_classifier.predict(X_test)
accuracy = accuracy_score(y_pred, y_test)
matrix = confusion_matrix(y_pred, y_test)
matrix
accuracy

/Users/shrinivass/opt/anaconda3/lib/python3.9/site-packages/sklearn/
utils/validation.py:993: DataConversionWarning:

A column-vector y was passed when a 1d array was expected. Please
change the shape of y to (n_samples, ), for example using ravel().


0.0

y_pred_ = svm_classifier.predict([[1, 114, 316, 3]])
y_pred_

/Users/shrinivass/opt/anaconda3/lib/python3.9/site-packages/sklearn/
base.py:450: UserWarning:

X does not have valid feature names, but SVC was fitted with feature
names


array([106])
```

```
plt.plot(y_pred, y_test)
plt.show()
```