In [1]:
```
import numpy as np
import pandas as pd
import matplotlib.pyplot as plt
import seaborn as sns
from sklearn.model_selection import train_test_split
from sklearn.linear_model import LinearRegression
```

In [2]:
```
df = pd.read_csv("Horse.csv")
# .dropna(axis="columns")
df
```

Out[2]:

	Dato	Track	Race Number	Distance	Surface	Prize money	Starting position	Jockey	Jockey weight	Country	...
0	03.09.2017	Sha Tin	10	1400	Gress	1310000	6	K C Leung	52	Sverige	...
1	16.09.2017	Sha Tin	10	1400	Gress	1310000	14	C Y Ho	52	Sverige	...
2	14.10.2017	Sha Tin	10	1400	Gress	1310000	8	C Y Ho	52	Sverige	...
3	11.11.2017	Sha Tin	9	1600	Gress	1310000	13	Brett Prebble	54	Sverige	...
4	26.11.2017	Sha Tin	9	1600	Gress	1310000	9	C Y Ho	52	Sverige	...
...	...	...	...	...	...	...	...	...	...	...	...
27003	14.06.2020	Sha Tin	11	1200	Gress	1450000	6	A Hamelin	59	Australia	...
27004	21.06.2020	Sha Tin	2	1200	Gress	967000	7	K C Leung	57	Australia	...
27005	21.06.2020	Sha Tin	4	1200	Gress	967000	6	Blake Shinn	57	Australia	...
27006	21.06.2020	Sha Tin	5	1200	Gress	967000	14	Joao Moreira	57	New Zealand	...
27007	21.06.2020	Sha Tin	11	1200	Gress	1450000	7	C Schofield	55	New Zealand	...

27008 rows × 21 columns

In [3]:
```
df.head()
```

Out[3]:

	Dato	Track	Race Number	Distance	Surface	Prize money	Starting position	Jockey	Jockey weight	Country	...	Train
0	03.09.2017	Sha Tin	10	1400	Gress	1310000	6	K C Leung	52	Sverige	...	

	Dato	Track	Race Number	Distance	Surface	Prize money	Starting position	Jockey	Jockey weight	Country	...	Train
1	16.09.2017	Sha Tin	10	1400	Gress	1310000	14	C Y Ho	52	Sverige	...	
2	14.10.2017	Sha Tin	10	1400	Gress	1310000	8	C Y Ho	52	Sverige	...	
3	11.11.2017	Sha Tin	9	1600	Gress	1310000	13	Brett Prebble	54	Sverige	...	
4	26.11.2017	Sha Tin	9	1600	Gress	1310000	9	C Y Ho	52	Sverige	...	

5 rows × 21 columns

Data cleaning and pre processing

In [4]:
```
df.info()
```

```
<class 'pandas.core.frame.DataFrame'>
RangeIndex: 27008 entries, 0 to 27007
Data columns (total 21 columns):
 #   Column             Non-Null Count  Dtype 
---  ------             --------------  ----- 
 0   Dato               27008 non-null  object
 1   Track              27008 non-null  object
 2   Race Number        27008 non-null  int64 
 3   Distance           27008 non-null  int64 
 4   Surface            27008 non-null  object
 5   Prize money        27008 non-null  int64 
 6   Starting position  27008 non-null  int64 
 7   Jockey             27008 non-null  object
 8   Jockey weight      27008 non-null  int64 
 9   Country            27008 non-null  object
 10  Horse age          27008 non-null  int64 
 11  TrainerName        27008 non-null  object
 12  Race time          27008 non-null  object
 13  Path               27008 non-null  int64 
 14  Final place        27008 non-null  int64 
 15  FGrating           27008 non-null  int64 
 16  Odds               27008 non-null  object
 17  RaceType           27008 non-null  object
 18  HorseId            27008 non-null  int64 
 19  JockeyId           27008 non-null  int64 
 20  TrainerID          27008 non-null  int64 
dtypes: int64(12), object(9)
memory usage: 4.3+ MB
```

In [5]:
```
df.describe()
```

Out[5]:

	Race Number	Distance	Prize money	Starting position	Jockey weight	Horse age	Pat
count	27008.000000	27008.000000	2.700800e+04	27008.000000	27008.000000	27008.000000	27008.00000
mean	5.268624	1401.666173	1.479445e+06	6.741447	55.867373	5.246408	1.67802

	Race Number	Distance	Prize money	Starting position	Jockey weight	Horse age	Pat
std	2.780088	276.065045	2.162109e+06	3.691071	2.737006	1.519880	1.63178
min	1.000000	1000.000000	6.600000e+05	1.000000	47.000000	2.000000	0.00000
25%	3.000000	1200.000000	9.200000e+05	4.000000	54.000000	4.000000	0.00000
50%	5.000000	1400.000000	9.670000e+05	7.000000	56.000000	5.000000	1.00000
75%	8.000000	1650.000000	1.450000e+06	10.000000	58.000000	6.000000	3.00000
max	11.000000	2400.000000	2.800000e+07	14.000000	63.000000	12.000000	11.00000

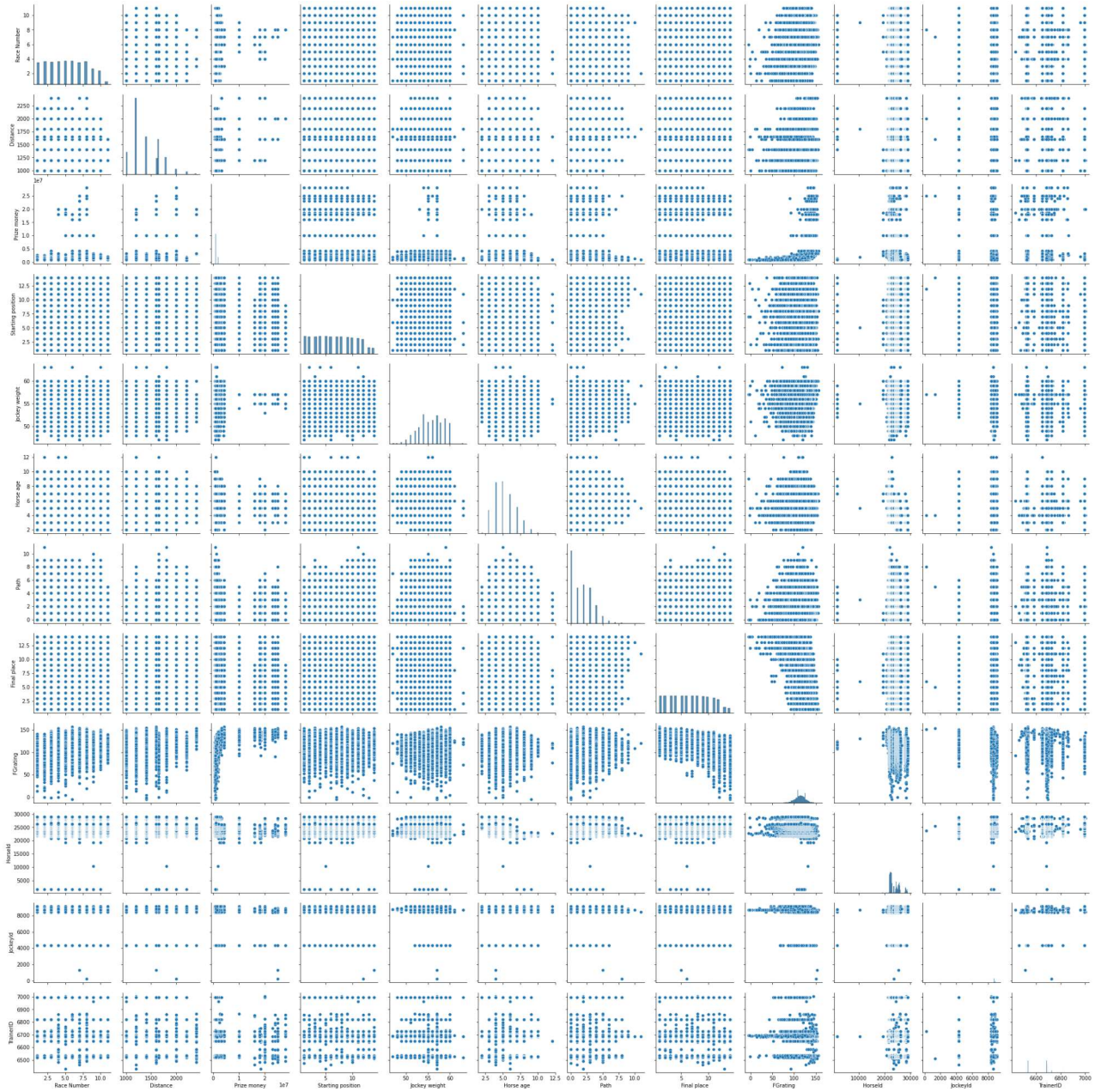
In [6]:
```
df.columns
```

Out[6]:
```
Index(['Dato', 'Track', 'Race Number', 'Distance', 'Surface', 'Prize money',
       'Starting position', 'Jockey', 'Jockey weight', 'Country', 'Horse age',
       'TrainerName', 'Race time', 'Path', 'Final place', 'FGrating', 'Odds',
       'RaceType', 'HorseId', 'JockeyId', 'TrainerID'],
      dtype='object')
```

EDA and VISUALIZATION

In [7]:
```
sns.pairplot(df)
```

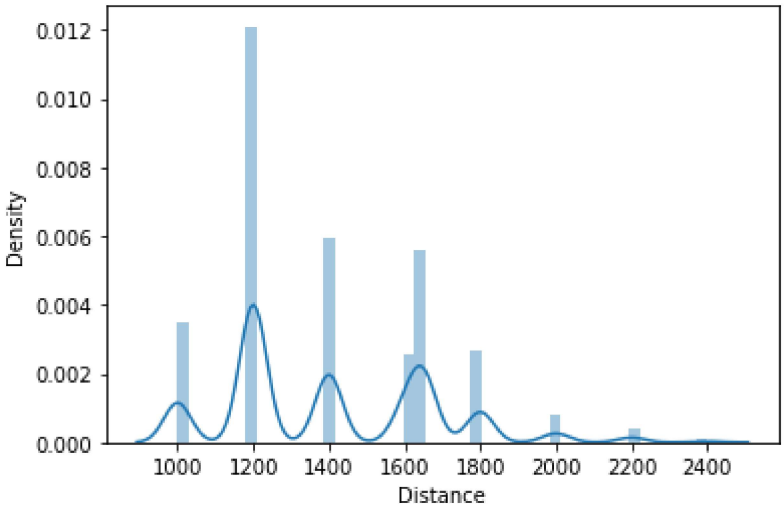
Out[7]:
```
<seaborn.axisgrid.PairGrid at 0x22d261e4d30>
```



In [8]:
```
sns.distplot(df['Distance'])
```

```
C:\ProgramData\Anaconda3\lib\site-packages\seaborn\distributions.py:2557: FutureWarning:
`distplot` is a deprecated function and will be removed in a future version. Please adap
t your code to use either `displot` (a figure-level function with similar flexibility) o
r `histplot` (an axes-level function for histograms).
  warnings.warn(msg, FutureWarning)
```

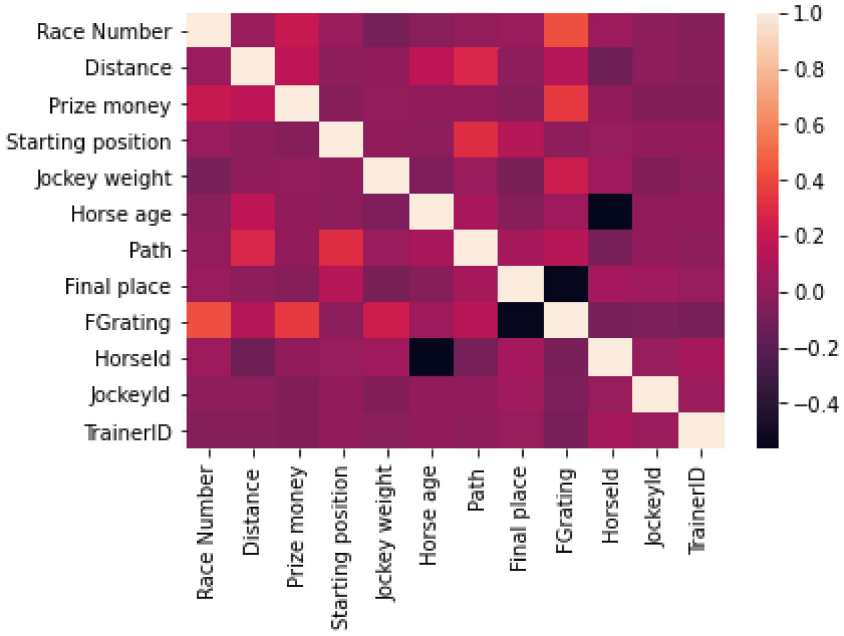
Out[8]: <AxesSubplot:xlabel='Distance', ylabel='Density'>



In [9]:
```
df1 = df[['Dato', 'Track', 'Race Number', 'Distance', 'Surface', 'Prize money',
       'Starting position', 'Jockey', 'Jockey weight', 'Country', 'Horse age',
       'TrainerName', 'Race time', 'Path', 'Final place', 'FGrating', 'Odds',
       'RaceType', 'HorseId', 'JockeyId', 'TrainerID']]
```

In [10]:
```
sns.heatmap(df1.corr())
```

Out[10]: <AxesSubplot:>



In [11]:
```
x = df1[['Race Number','Distance','Prize money','Starting position','Jockey weight','Ho
y = df1[ 'FGrating']
```

split the data into training and test data

In [12]:
```
x_train, x_test, y_train, y_test = train_test_split(x,y,test_size=0.3)
```

In [13]:
```
lr = LinearRegression()
lr.fit(x_train, y_train)
```

Out[13]:
```
LinearRegression()
```

In [14]:
```
lr.intercept_
```

Out[14]:
```
103.26452702234762
```

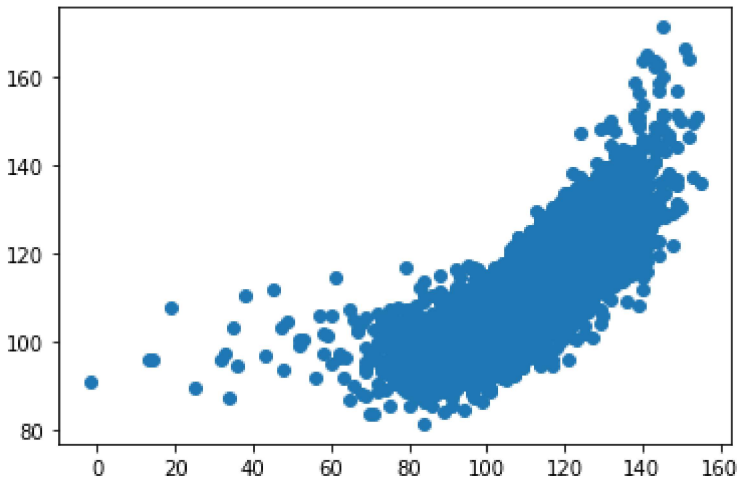
In [15]:
```
coeff = pd.DataFrame(lr.coef_, x.columns, columns =['Co-efficient'])
coeff
```

Out[15]:

	Co-efficient
Race Number	1.978596
Distance	0.000763
Prize money	0.000001
Starting position	0.018379
Jockey weight	1.048681
Horse age	0.081309
Path	1.320737
Final place	-2.006538
HorseId	-0.000318
JockeyId	-0.000159
TrainerID	-0.006368

In [16]:
```
prediction = lr.predict(x_test)
plt.scatter(y_test, prediction)
```

Out[16]:
```
<matplotlib.collections.PathCollection at 0x22d35764b50>
```



In [17]:
```
lr.score(x_test,y_test)
```

Out[17]: 0.638075942973994

ACURACY

In [18]:
```
from sklearn.linear_model import Ridge,Lasso
```

In [19]:
```
rr=Ridge(alpha=10)
rr.fit(x_train,y_train)
rr.score(x_test,y_test)
rr.score(x_train,y_train)
```

Out[19]: 0.6437443848956526

In [20]:
```
rr.score(x_test,y_test)
```

Out[20]: 0.6380777574660531

In [21]:
```
la = Lasso(alpha=10)
la.fit(x_train,y_train)
```

Out[21]: Lasso(alpha=10)

In [22]:
```
la.score(x_test,y_test)
```

Out[22]: 0.44070666145616955