```
import pandas as pd
import numpy as np
import seaborn as sns
import matplotlib.pyplot as plt
%matplotlib inline
from scipy.stats import chi2_contingency
import seaborn as sns
from sklearn.neighbors import KNeighborsClassifier
from random import randrange, uniform


Train_Data = pd.read_csv(r'trainn.csv')
Train_Data.head(1)
```

	Unnamed: 0	key	fare_amount	pickup_datetime	pickup_longitude	pickup_latitude	dropoff_longitude	dropoff_latitude	passe

```
Train_Data.drop(labels='Unnamed: 0',axis=1,inplace=True)


Train_Data.drop(labels='key',axis=1,inplace=True)


Train_Data.shape
```

```
(200000, 7)
```

```
test = pd.read_csv(r'testt.csv')
test.head(1)
```

	Unnamed: 0	Unnamed: 0.1	Unnamed: 0.1.1	key	pickup_datetime	pickup_longitude	pickup_latitude	dropoff_longitude	dropoff_latitu

```
test.shape,Train_Data.shape
```

```
((50000, 10), (200000, 7))
```

```
Train_Data.head()
```

	fare_amount	pickup_datetime	pickup_longitude	pickup_latitude	dropoff_longitude	dropoff_latitude	passenger_count
0	7.5	2015-05-07 19:52:06 UTC	-73.999817	40.738354	-73.999512	40.723217	1
1	7.7	2009-07-17 20:04:56 UTC	-73.994355	40.728225	-73.994710	40.750325	1
2	12.9	2009-08-24 21:45:00 UTC	-74.005043	40.740770	-73.962565	40.772647	1
3	5.3	2009-06-26 08:22:21 UTC	-73.976124	40.790844	-73.965316	40.803349	3
4	16.0	2014-08-28 17:47:00 UTC	-73.925023	40.744085	-73.973082	40.761247	5

```
test.head()
```

	Unnamed: 0	Unnamed: 0.1	Unnamed: 0.1.1	key	pickup_datetime	pickup_longitude	pickup_latitude	dropoff_longitude	dropoff_latitu
0	0	37338	31401407	2011-02-10 19:06:00.000000169	2011-02-10 19:06:00 UTC	-73.951662	40.790710	-73.947570	40.7562
1	1	160901	33158465	2011-06-23 09:24:00.000000157	2011-06-23 09:24:00 UTC	-73.951007	40.771508	-73.974075	40.7635
2	2	40428	10638355	2012-07-14 10:37:00.000000149	2012-07-14 10:37:00 UTC	-73.996473	40.747930	-73.990298	40.756
3	3	63353	3836845	2014-10-19 22:27:05.0000002	2014-10-19 22:27:05 UTC	-73.997934	40.716890	-73.952617	40.727

As this is Taxi fare data and we know there are many factors which affect the price of taxi like

1. Travelled distance
2. Time of Travel
3. Demand and Availability of Taxi
4. Some special places are more costlier like Airport or other places where there might be toll

```
print(Train_Data.info())
print(test.info())
```

```
<class 'pandas.core.frame.DataFrame'>
RangeIndex: 200000 entries, 0 to 199999
Data columns (total 7 columns):
fare_amount          200000 non-null float64
pickup_datetime      200000 non-null object
pickup_longitude     200000 non-null float64
pickup_latitude      200000 non-null float64
dropoff_longitude    199999 non-null float64
dropoff_latitude     199999 non-null float64
passenger_count      200000 non-null int64
dtypes: float64(5), int64(1), object(1)
memory usage: 10.7+ MB
None
<class 'pandas.core.frame.DataFrame'>
RangeIndex: 50000 entries, 0 to 49999
Data columns (total 10 columns):
Unnamed: 0           50000 non-null int64
Unnamed: 0.1         50000 non-null int64
Unnamed: 0.1.1       50000 non-null int64
key                  50000 non-null object
pickup_datetime      50000 non-null object
pickup_longitude     50000 non-null float64
pickup_latitude      50000 non-null float64
dropoff_longitude    50000 non-null float64
dropoff_latitude     50000 non-null float64
passenger_count      50000 non-null int64
dtypes: float64(4), int64(4), object(2)
memory usage: 3.8+ MB
None
```

here we can see there are 8columns in which 6 numerics and 2 are object.

Lets change the type of pickup_datetime from object to DateTime

```
Train_Data["pickup_datetime"] = pd.to_datetime(Train_Data["pickup_datetime"])
```

```
print(Train_Data.info())
```

```
<class 'pandas.core.frame.DataFrame'>
RangeIndex: 200000 entries, 0 to 199999
Data columns (total 7 columns):
fare_amount          200000 non-null float64
pickup_datetime      200000 non-null datetime64[ns, UTC]
pickup_longitude     200000 non-null float64
pickup_latitude      200000 non-null float64
dropoff_longitude    199999 non-null float64
dropoff_latitude     199999 non-null float64
passenger_count      200000 non-null int64
dtypes: datetime64[ns, UTC](1), float64(5), int64(1)
memory usage: 10.7 MB
None
```

```
Train_Data.describe()
```

	fare_amount	pickup_longitude	pickup_latitude	dropoff_longitude	dropoff_latitude	passenger_count
count	200000.000000	200000.000000	200000.000000	199999.000000	199999.000000	200000.000000
mean	11.359955	-72.527638	39.935885	-72.525292	39.923890	1.684535
std	9.901776	11.437787	7.720539	13.117408	6.794829	1.385997
min	-52.000000	-1340.648410	-74.015515	-3356.666300	-881.985513	0.000000
25%	6.000000	-73.992065	40.734796	-73.991407	40.733823	1.000000
50%	8.500000	-73.981823	40.752592	-73.980093	40.753042	1.000000
75%	12.500000	-73.967154	40.767158	-73.963658	40.768001	2.000000
max	499.000000	57.418457	1644.421482	1153.572603	872.697628	208.000000

1.Here first thing which we can see is minimum value of fare is negative which is -52 which is not the valid value, so we need to remove the fare which are negative values.

2.Secondly, passenger_count minimum value is 0 and maximum value is 208 which impossible, so we need to remove them as well, for safer side we can think that a taxi can have maximum 7 people.

Unsupported Cell Type. Double-Click to inspect/edit the content.

```
Train_Data.isnull().sum()
```

```
fare_amount          0
pickup_datetime      0
pickup_longitude     0
pickup_latitude      0
dropoff_longitude    1
dropoff_latitude     1
passenger_count      0
dtype: int64
```

```
Train_Data.dropna(axis = 0, inplace= True)
```

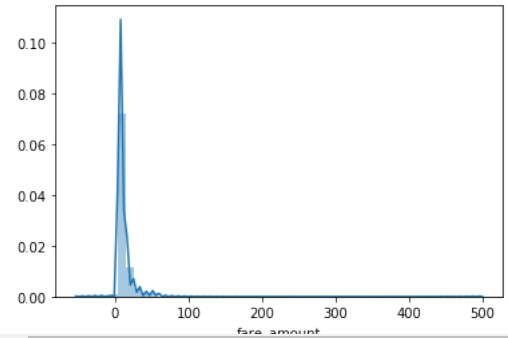
```
print(Train_Data.isnull().sum())
```

```
fare_amount          0
pickup_datetime      0
pickup_longitude     0
pickup_latitude      0
dropoff_longitude    0
dropoff_latitude     0
passenger_count      0
dtype: int64
```

Lets see the statistics of our data

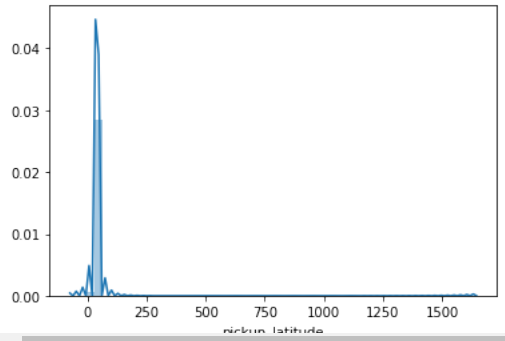
```
sns.distplot(Train_Data['fare_amount'])
```

```
<matplotlib.axes._subplots.AxesSubplot at 0xd297c2b608>
```



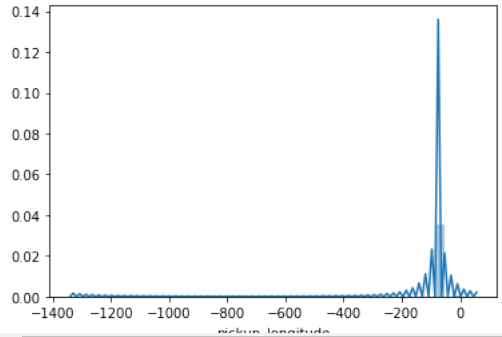

```
sns.distplot(Train_Data['pickup_latitude'])
```

```
<matplotlib.axes._subplots.AxesSubplot at 0xd297d1b648>
```



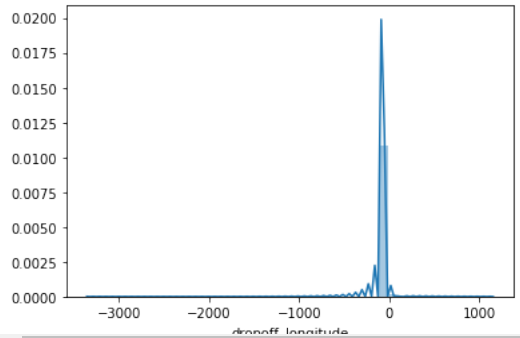

```
sns.distplot(Train_Data['pickup_longitude'])
```

```
<matplotlib.axes._subplots.AxesSubplot at 0xd297e87648>
```



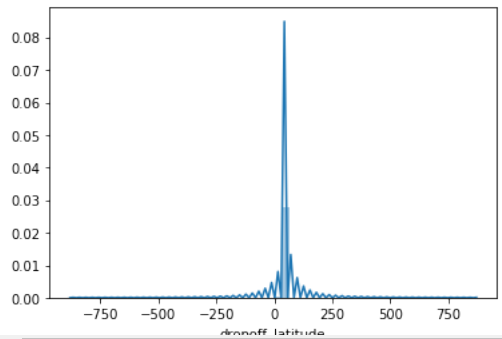

```
sns.distplot(Train_Data['dropoff_longitude'])
```

```
<matplotlib.axes._subplots.AxesSubplot at 0xd297e84c48>
```




```
sns.distplot(Train_Data['dropoff_latitude'])
```

```
<matplotlib.axes._subplots.AxesSubplot at 0xd298b91588>
```




```
print("drop_off latitude min value",Train_Data["dropoff_latitude"].min())
print("drop_off latitude max value",Train_Data["dropoff_latitude"].max())
print("drop_off longitude min value", Train_Data["dropoff_longitude"].min())
print("drop_off longitude max value",Train_Data["dropoff_longitude"].max())
print("pickup latitude min value",Train_Data["pickup_latitude"].min())
```

```
print("pickup latitude max value",Train_Data["pickup_latitude"].max())
print("pickup longitude min value",Train_Data["pickup_longitude"].min())
print("pickup longitude max value",Train_Data["pickup_longitude"].max())
```

```
drop_off latitude min value -881.9855130000002
drop_off latitude max value 872.6976279999999
drop_off longitude min value -3356.6663
drop_off longitude max value 1153.5726029999996
pickup latitude min value -74.01551500000002
pickup latitude max value 1644.421482
pickup longitude min value -1340.64841
pickup longitude max value 57.418457
```

```
print("drop_off latitude min value",test["dropoff_latitude"].min())
print("drop_off latitude max value",test["dropoff_latitude"].max())
print("drop_off longitude min value", test["dropoff_longitude"].min())
print("drop_off longitude max value",test["dropoff_longitude"].max())
print("pickup latitude min value",test["pickup_latitude"].min())
print("pickup latitude max value",test["pickup_latitude"].max())
print("pickup longitude min value",test["pickup_longitude"].min())
print("pickup longitude max value",test["pickup_longitude"].max())
```

```
drop_off latitude min value -74.00110699999998
drop_off latitude max value 47.433332
drop_off longitude min value -1491.194073
drop_off longitude max value 40.796262
pickup latitude min value -74.001047
pickup latitude max value 42.46842
pickup longitude min value -80.734728
pickup longitude max value 40.812005
```

```
min_longitude=-1491.194073,
min_latitude=-74.001047,
max_longitude=40.812005,
max_latitude=41.709555
```

```
min_longitude=-1491.194073,
min_latitude=-74.001047,
max_longitude=40.812005,
max_latitude=41.709555
```

```
tempdf=Train_Data[(Train_Data["dropoff_latitude"]<min_latitude) |
                (Train_Data["pickup_latitude"]<min_latitude) |
                (Train_Data["dropoff_longitude"]<min_longitude) |
                (Train_Data["pickup_longitude"]<min_longitude) |
                (Train_Data["dropoff_latitude"]>max_latitude) |
                (Train_Data["pickup_latitude"]>max_latitude) |
                (Train_Data["dropoff_longitude"]>max_longitude) |
                (Train_Data["pickup_longitude"]>max_longitude) ]
print("before droping",Train_Data.shape)
Train_Data.drop(tempdf.index,inplace=True)
print("after droping",Train_Data.shape)
```

```
before droping (199999, 7)
after droping (199961, 7)
```

```
import calendar
Train_Data['day']=Train_Data['pickup_datetime'].apply(lambda x:x.day)
Train_Data['hour']=Train_Data['pickup_datetime'].apply(lambda x:x.hour)
Train_Data['month']=Train_Data['pickup_datetime'].apply(lambda x:x.month)
Train_Data['year']=Train_Data['pickup_datetime'].apply(lambda x:x.year)
Train_Data['weekday']=Train_Data['pickup_datetime'].apply(lambda x: calendar.day_name[x.weekday()])
```

```
Train_Data.weekday = Train_Data.weekday.map({'Sunday':0,'Monday':1,'Tuesday':2,'Wednesday':3,'Thursday':4,'Friday':5,'Saturday':6})
```

```
Train_Data.drop(labels = 'pickup_datetime',axis=1,inplace=True)
```

```
Train_Data.head(1)
Train_Data.info()
```

```
<class 'pandas.core.frame.DataFrame'>
Int64Index: 199961 entries, 0 to 199999
Data columns (total 11 columns):
fare_amount          199961 non-null float64
```

```
pickup_longitude     199961 non-null float64
pickup_latitude      199961 non-null float64
dropoff_longitude    199961 non-null float64
dropoff_latitude     199961 non-null float64
passenger_count      199961 non-null int64
day                  199961 non-null int64
hour                 199961 non-null int64
month                199961 non-null int64
year                 199961 non-null int64
weekday              199961 non-null int64
dtypes: float64(5), int64(6)
memory usage: 18.3 MB
```

Model Building

```
from sklearn.model_selection import train_test_split
```

```
x=Train_Data.drop("fare_amount", axis=1)
x
```

	pickup_longitude	pickup_latitude	dropoff_longitude	dropoff_latitude	passenger_count	day	hour	month	year	weekday
0	-73.999817	40.738354	-73.999512	40.723217	1	7	19	5	2015	4
1	-73.994355	40.728225	-73.994710	40.750325	1	17	20	7	2009	5
2	-74.005043	40.740770	-73.962565	40.772647	1	24	21	8	2009	1
3	-73.976124	40.790844	-73.965316	40.803349	3	26	8	6	2009	5
4	-73.925023	40.744085	-73.973082	40.761247	5	28	17	8	2014	4
...	...	...	...	...	...	...	...	...	...	...
199995	-73.987042	40.739367	-73.986525	40.740297	1	28	10	10	2012	0
199996	-73.984722	40.736837	-74.006672	40.739620	1	14	1	3	2014	5
199997	-73.986017	40.756487	-73.858957	40.692588	2	29	0	6	2009	1
199998	-73.997124	40.725452	-73.983215	40.695415	1	20	14	5	2015	3
199999	-73.984395	40.720077	-73.985508	40.768793	1	15	4	5	2010	6

199961 rows × 10 columns

```
y=Train_Data["fare_amount"]
```

```
x_train,x_test,y_train,y_test = train_test_split(x,y,test_size=0.2,random_state=101)
```

```
x_train.head()
```

	pickup_longitude	pickup_latitude	dropoff_longitude	dropoff_latitude	passenger_count	day	hour	month	year	weekday
36449	-73.963597	40.761797	-73.970199	40.762533	1	4	22	9	2014	4
177679	-74.013143	40.705700	-73.867012	40.768862	4	2	17	1	2013	3
36877	-73.993683	40.702455	-73.917713	40.684747	2	31	3	10	2010	0
20428	-73.954686	40.780613	-73.971005	40.758253	1	29	10	8	2012	3
18927	-73.978887	40.777162	-73.993860	40.746392	1	14	16	7	2013	0

```
x_test.head()
```

	pickup_longitude	pickup_latitude	dropoff_longitude	dropoff_latitude	passenger_count	day	hour	month	year	weekday
35707	-73.979422	40.743943	-73.969162	40.758608	1	26	16	6	2012	2
37333	-74.000873	40.747298	-73.991410	40.764548	2	14	17	4	2011	4
131999	-74.007640	40.732222	-73.988398	40.748832	5	29	8	11	2010	1
106818	-73.960133	40.719825	-73.942702	40.717567	4	6	21	9	2013	5
52881	-73.995711	40.764551	-73.991177	40.750312	2	1	8	5	2009	5

```
y_train.head()
```

```
36449      4.5
177679    47.3
36877     20.9
20428      8.9
18927     11.0
Name: fare_amount, dtype: float64
```

```
y_test.head()
```

```
35707     7.3
37333     6.5
131999    8.1
106818    8.5
52881     9.7
Name: fare_amount, dtype: float64
```

```
print(x_train.shape)
print(x_test.shape)
print(y_test.shape)
print(y_train.shape)
```

```
(159968, 10)
(39993, 10)
(39993,)
(159968,)
```

Linear Regression

```
from sklearn.linear_model import LinearRegression
```

```
lrmodel=LinearRegression()
lrmodel.fit(x_train, y_train)
```

```
LinearRegression()
```

```
predictedvalues = lrmodel.predict(x_test)
```

```
from sklearn.metrics import mean_squared_error
```

```
lrmodelrmse = np.sqrt(mean_squared_error(predictedvalues, y_test))
print("RMSE value for Linear regression is", lrmodelrmse)
```

```
RMSE value for Linear regression is 10.05963609768883
```

Random Forest

```
from sklearn.ensemble import RandomForestRegressor
rfrmodel = RandomForestRegressor(n_estimators=100, random_state=101)
```

```
rfrmodel.fit(x_train,y_train)
rfrmodel_pred= rfrmodel.predict(x_test)
```

```
rfrmodel_rmse=np.sqrt(mean_squared_error(rfrmodel_pred, y_test))
print("RMSE value for Random forest regression is ",rfrmodel_rmse)
```

```
RMSE value for Random forest regression is  4.838358623297524
```

```
rfrmodel_pred.shape
```

```
(39993,)
```

Working on Test Data

```
test = pd.read_csv(r'testt.csv')
```

```
test.drop(test[['Unnamed: 0','Unnamed: 0.1','Unnamed: 0.1.1','key']],axis=1,inplace=True)
```

```
test.isnull().sum()
```

```
pickup_datetime      0
pickup_longitude     0
pickup_latitude      0
dropoff_longitude    0
dropoff_latitude     0
passenger_count      0
dtype: int64
```

```
test["pickup_datetime"] = pd.to_datetime(test["pickup_datetime"])
```

```
test['day']=test['pickup_datetime'].apply(lambda x:x.day)
test['hour']=test['pickup_datetime'].apply(lambda x:x.hour)
test['month']=test['pickup_datetime'].apply(lambda x:x.month)
test['year']=test['pickup_datetime'].apply(lambda x:x.year)
test['weekday']=test['pickup_datetime'].apply(lambda x: calendar.day_name[x.weekday()])
```

```
test.head(5)
```

	pickup_longitude	pickup_latitude	dropoff_longitude	dropoff_latitude	passenger_count	day	hour	month	year	weekday
0	-73.951662	40.790710	-73.947570	40.756220	1	10	19	2	2011	4
1	-73.951007	40.771508	-73.974075	40.763553	1	23	9	6	2011	4
2	-73.996473	40.747930	-73.990298	40.756152	6	14	10	7	2012	6
3	-73.997934	40.716890	-73.952617	40.727149	1	19	22	10	2014	0
4	-73.952583	40.714039	-73.906128	40.711281	1	25	22	5	2015	1

```
test.drop(['pickup_datetime'], axis = 1, inplace = True)
```

```
test.weekday = test.weekday.map({'Sunday':0,'Monday':1,'Tuesday':2,'Wednesday':3,'Thursday':4,'Friday':5,'Saturday':6})
```

```
rfrmodel_pred= rfrmodel.predict(test)
```

```
df = pd.DataFrame(rfrmodel_pred)
df
```

	0
0	11.2380
1	9.1880
2	5.9320
3	11.8570
4	11.9080
...	...
49995	6.7250
49996	27.4532
49997	7.4750
49998	7.7190
49999	10.8940

50000 rows × 1 columns

Start coding or generate with AI.

Start coding or generate with AI.