In [1]:
```
import numpy as np
import pandas as pd
import matplotlib.pyplot as plt
import seaborn as sns
```

In [2]:
```
df=pd.read_csv(r"C:\Users\Admin\Downloads\6_Salesworkload1 - 6_Salesworkload1.c
df
```

Out[2]:

	MonthYear	Time index	Country	StoreID	City	Dept_ID	Dept. Name	HoursOwn	HoursLea
0	10.2016	1.0	United Kingdom	88253.0	London (I)	1.0	Dry	3184.764	
1	10.2016	1.0	United Kingdom	88253.0	London (I)	2.0	Frozen	1582.941	
2	10.2016	1.0	United Kingdom	88253.0	London (I)	3.0	other	47.205	
3	10.2016	1.0	United Kingdom	88253.0	London (I)	4.0	Fish	1623.852	
4	10.2016	1.0	United Kingdom	88253.0	London (I)	5.0	Fruits & Vegetables	1759.173	
...	...	...	...	...	...	...	...	...	
7653	6.2017	9.0	Sweden	29650.0	Gothenburg	12.0	Checkout	6322.323	
7654	6.2017	9.0	Sweden	29650.0	Gothenburg	16.0	Customer Services	4270.479	
7655	6.2017	9.0	Sweden	29650.0	Gothenburg	11.0	Delivery	0	
7656	6.2017	9.0	Sweden	29650.0	Gothenburg	17.0	others	2224.929	
7657	6.2017	9.0	Sweden	29650.0	Gothenburg	18.0	all	39652.2	

7658 rows × 14 columns

In [3]:
```
df1=df.head(100)
```

In [4]:
```
df1.info()
```

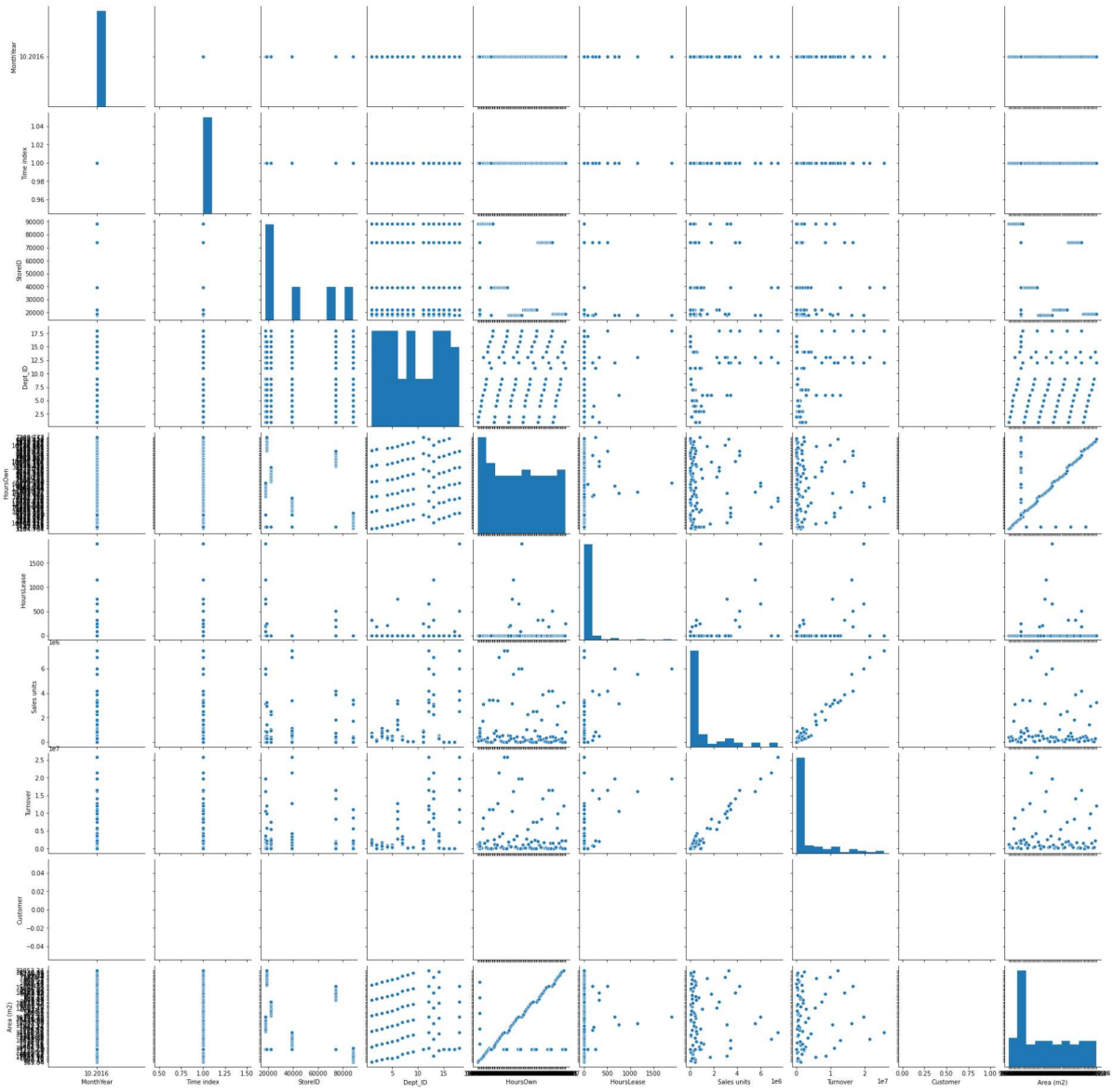
```
<class 'pandas.core.frame.DataFrame'>
RangeIndex: 100 entries, 0 to 99
Data columns (total 14 columns):
 #   Column         Non-Null Count  Dtype  
---  ------         --------------  -----  
 0   MonthYear      100 non-null    object 
 1   Time index     100 non-null    float64
 2   Country        100 non-null    object 
 3   StoreID        100 non-null    float64
 4   City           100 non-null    object 
 5   Dept_ID        100 non-null    float64
 6   Dept. Name     100 non-null    object 
 7   HoursOwn       100 non-null    object 
 8   HoursLease     100 non-null    float64
 9   Sales units    100 non-null    float64
 10  Turnover       100 non-null    float64
 11  Customer       0 non-null      float64
 12  Area (m2)      100 non-null    object 
 13  Opening hours  100 non-null    object 
dtypes: float64(7), object(7)
memory usage: 11.1+ KB
```

In [5]:
```
df1.columns
```

Out[5]:
```
Index(['MonthYear', 'Time index', 'Country', 'StoreID', 'City', 'Dept_ID',
       'Dept. Name', 'HoursOwn', 'HoursLease', 'Sales units', 'Turnover',
       'Customer', 'Area (m2)', 'Opening hours'],
      dtype='object')
```

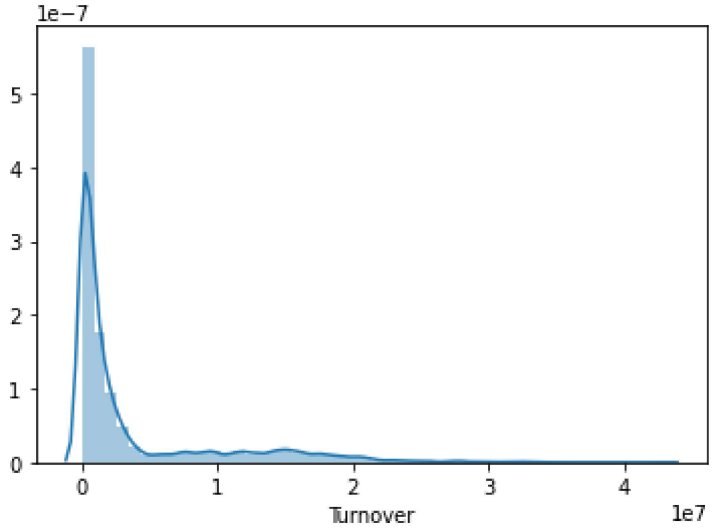
In [6]:
```
sns.pairplot(df1)
```

Out[6]:
```
<seaborn.axisgrid.PairGrid at 0x1f38e7b4ac0>
```



In [7]:
```
sns.distplot(df['Turnover'])
```

Out[7]:
```
<matplotlib.axes._subplots.AxesSubplot at 0x1f3951b4ac0>
```



In [8]:
```
df2=df1[[ 'Time index','StoreID','Dept_ID',
          'HoursLease', 'Sales units', 'Turnover']]
df2
```

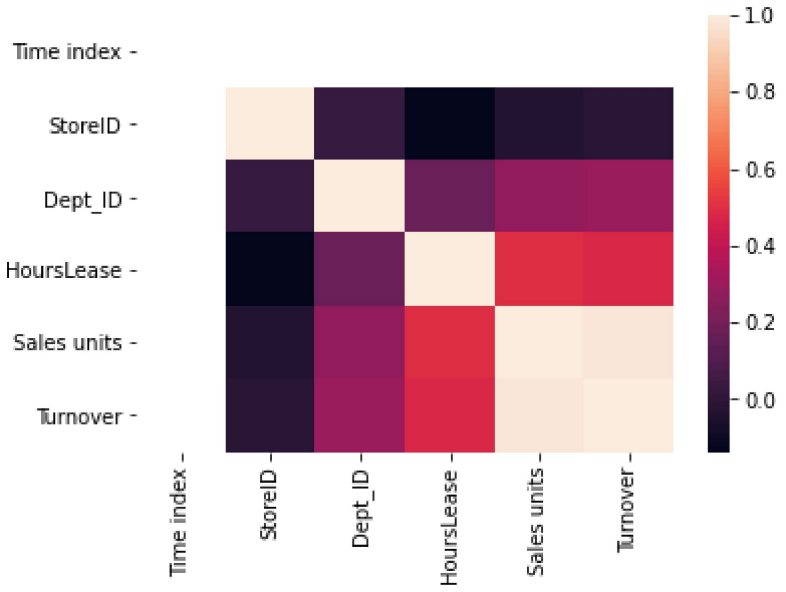
Out[8]:

	Time index	StoreID	Dept_ID	HoursLease	Sales units	Turnover
0	1.0	88253.0	1.0	0.0	398560.0	1226244.0
1	1.0	88253.0	2.0	0.0	82725.0	387810.0
2	1.0	88253.0	3.0	0.0	438400.0	654657.0
3	1.0	88253.0	4.0	0.0	309425.0	499434.0
4	1.0	88253.0	5.0	0.0	165515.0	329397.0
...	...	...	...	...	...	...
95	1.0	18808.0	14.0	0.0	301500.0	2319717.0
96	1.0	18808.0	15.0	0.0	25.0	0.0
97	1.0	18808.0	12.0	0.0	3262240.0	12161196.0
98	1.0	18808.0	16.0	0.0	25.0	0.0
99	1.0	18808.0	11.0	246.0	843615.0	2204589.0

100 rows × 6 columns

In [9]:
```
sns.heatmap(df2.corr())
```

Out[9]: <matplotlib.axes._subplots.AxesSubplot at 0x1f396ffd2b0>



In [10]:
```
x=df2[[ 'Time index','StoreID','Dept_ID',
        'HoursLease', 'Sales units']]
y=df2[['Turnover']]
```

In [11]:
```
from sklearn.model_selection import train_test_split
x_train,x_test,y_train,y_test = train_test_split(x,y,test_size=0.3)
```

In [12]:
```
from sklearn.linear_model import LinearRegression
lr= LinearRegression()
lr.fit(x_train,y_train)
```

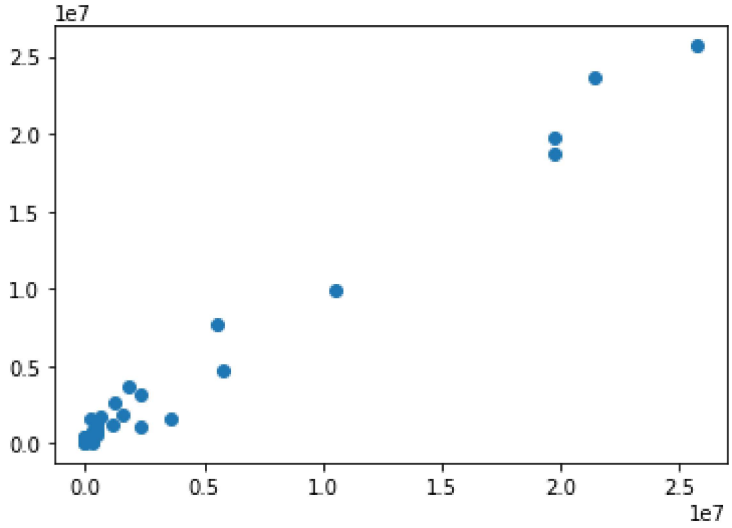
Out[12]: LinearRegression()

In [13]:
```
print(lr.intercept_)
```

```
[-307202.09884737]
```

In [14]:
```
prediction= lr.predict(x_test)
plt.scatter(y_test,prediction)
```

Out[14]: <matplotlib.collections.PathCollection at 0x1f397449550>



In [15]:
```
print(lr.score(x_test,y_test))
```

```
0.9819447147257684
```

In [16]:
```
print(lr.score(x_train,y_train))
```

```
0.9645230553076005
```

In [17]:
```
from sklearn.linear_model import Ridge,Lasso
```

In [18]:
```
rr=Ridge(alpha=10)
rr.fit(x_train,y_train)
```

Out[18]: Ridge(alpha=10)

In [19]:
```
rr.score(x_test,y_test)
```

Out[19]: 0.9819403841994411

In [20]:
```
la=Lasso(alpha=10)
la.fit(x_train,y_train)
```

Out[20]: Lasso(alpha=10)

In [21]:
```
la.score(x_test,y_test)
```

Out[21]: 0.9819447033590374

In [22]:
```
from sklearn.linear_model import ElasticNet
en=ElasticNet()
en.fit(x_train,y_train)
```

Out[22]:
```
ElasticNet()
```

In [23]:
```
print(en.intercept_)
```

```
[-303786.03896017]
```

In [24]:
```
print(en.predict(x_test))
```

```
[ 1690094.97758901   537831.66645624   151380.60291373  7745894.44514637
  1797716.90549508   424191.71282178  1139379.42250465    51062.1052129
 23682266.41110219  4728581.26487076  2675313.08624526    41914.29034473
  1130304.58260804    89285.91473129   808297.51335411   146820.70568754
  3191002.08364742   790486.46183582  9882346.80353113   401565.27580421
  1617343.88122488  1536371.64106087   273726.85854688 19749558.96996737
   122958.78113783  1190437.73116536   757889.57248221  3734087.6841006
 18723981.69700243 25696262.00394028]
```

In [25]:
```
print(en.score(x_test,y_test))
```

```
0.9819296931253932
```

Evaluation

In [26]:
```
from sklearn import metrics
```

In [27]:
```
print("Mean Absolute Error",metrics.mean_absolute_error(y_test,prediction))
```

```
Mean Absolute Error 697725.7601946382
```

In [28]:
```
print("Mean Squared Error",metrics.mean_squared_error(y_test,prediction))
```

```
Mean Squared Error 948202622835.6746
```

In [29]:
```
print("Root Mean Squared Error:",np.sqrt(metrics.mean_squared_error(y_test,prec
```

```
Root Mean Squared Error: 973756.9629202528
```

In [ ]:
```

```