Linear Regression how best fit the data set

import numpy as np import pandas as pd import seaborn as sns import matplotlib.pyplot as plt from sklearn import preprocessing, svm from sklearn.model_selection import train_test_split from sklearn.linear_model import LinearRegression

In [1]:

```
#Step-1 : Importing all the required libraries
import numpy as np
import pandas as pd
import seaborn as sns
import matplotlib.pyplot as plt
from sklearn import preprocessing, svm
from sklearn.model_selection import train_test_split
from sklearn.linear_model import LinearRegression
```

In [2]:

```
#Step-2: Reading the Dataset
df=pd.read_csv(r"C:\Users\thara\Downloads\bottle.csv.zip")
df
```

```
C:\Users\smb06\AppData\Local\Temp\ipykernel_1480\2023639601.py:2: DtypeWar
ning: Columns (47,73) have mixed types. Specify dtype option on import or
set low_memory=False.
  df=pd.read_csv(r"C:\Users\smb06\Downloads\bottle.csv.zip")
```

Out[2]:

	Cst_Cnt	Btl_Cnt	Sta_ID	Depth_ID	Depthm	T_degC	Salnty	O2ml_L	STheta
0	1	1	054.0 056.0	19-4903CR-HY-060-0930-05400560-0000A-3	0	10.500	33.4400	NaN	25.64900
1	1	2	054.0 056.0	19-4903CR-HY-060-0930-05400560-0008A-3	8	10.460	33.4400	NaN	25.65600
2	1	3	054.0 056.0	19-4903CR-HY-060-0930-05400560-0010A-7	10	10.460	33.4370	NaN	25.65400
3	1	4	054.0 056.0	19-4903CR-HY-060-0930-05400560-0019A-3	19	10.450	33.4200	NaN	25.64300
4	1	5	054.0 056.0	19-4903CR-HY-060-0930-05400560-0020A-7	20	10.450	33.4210	NaN	25.64300
...	...	...	...	...	...	...	...	...	...
864858	34404	864859	093.4 026.4	20-1611SR-MX-310-2239-09340264-0000A-7	0	18.744	33.4083	5.805	23.87055
864859	34404	864860	093.4 026.4	20-1611SR-MX-310-2239-09340264-0002A-3	2	18.744	33.4083	5.805	23.87072
864860	34404	864861	093.4 026.4	20-1611SR-MX-310-2239-09340264-0005A-3	5	18.692	33.4150	5.796	23.88911
864861	34404	864862	093.4 026.4	20-1611SR-MX-310-2239-09340264-0010A-3	10	18.161	33.4062	5.816	24.01426

In [3]:

```
df = df[['Salnty','T_degC']]
#Taking only selected two attributes from dataset
df.columns = ['sal','Temp']
```

In [4]:

```
df.head()
```

Out[4]:

	sal	Temp
0	33.440	10.50
1	33.440	10.46
2	33.437	10.46
3	33.420	10.45
4	33.421	10.45

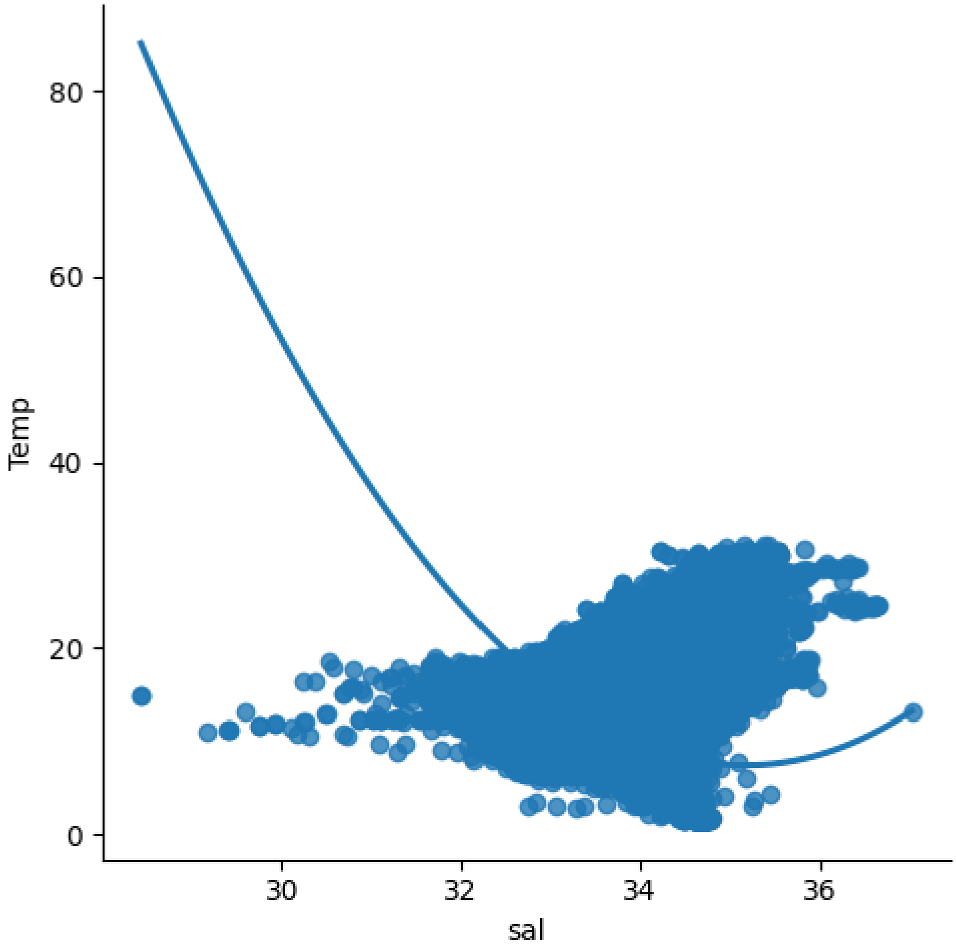
	Cst_Cnt	Btl_Cnt	Sta_ID	Depth_ID	Depthm	T_degC	Salnty	O2ml_L	STheta
864862	34404	864863	093.4 026.4	20-1611SR-MX-310-2239-09340264-0015A-3	15	17.533	33.3880	5.774	24.15297

In [5]:

```
#Step-3: Exploring the Data Scatter - plotting the data scatter
sns.lmplot(x="sal",y="Temp",data=df,order=2,ci=None)
```

Out[5]:

```
<seaborn.axisgrid.FacetGrid at 0x2694228c6d0>
```



In [6]:

```
#step 4: Dta cleaning - eliminating NON and missing input numbers
df.fillna(method='ffill',inplace=True)
```

```
C:\Users\smb06\AppData\Local\Temp\ipykernel_1480\477090421.py:2: SettingWi
thCopyWarning:
A value is trying to be set on a copy of a slice from a DataFrame

See the caveats in the documentation: https://pandas.pydata.org/pandas-doc
s/stable/user_guide/indexing.html#returning-a-view-versus-a-copy (https://
pandas.pydata.org/pandas-docs/stable/user_guide/indexing.html#returning-a-
view-versus-a-copy)
  df.fillna(method='ffill',inplace=True)
```

In [7]:

```
#step 5:Training our model
X=np.array(df['sal']).reshape(-1, 1)
y=np.array(df['Temp']).reshape(-1, 1)
#separating the data into independent and dependent variables and convert
#how each dataframe contains only one coloumn
```

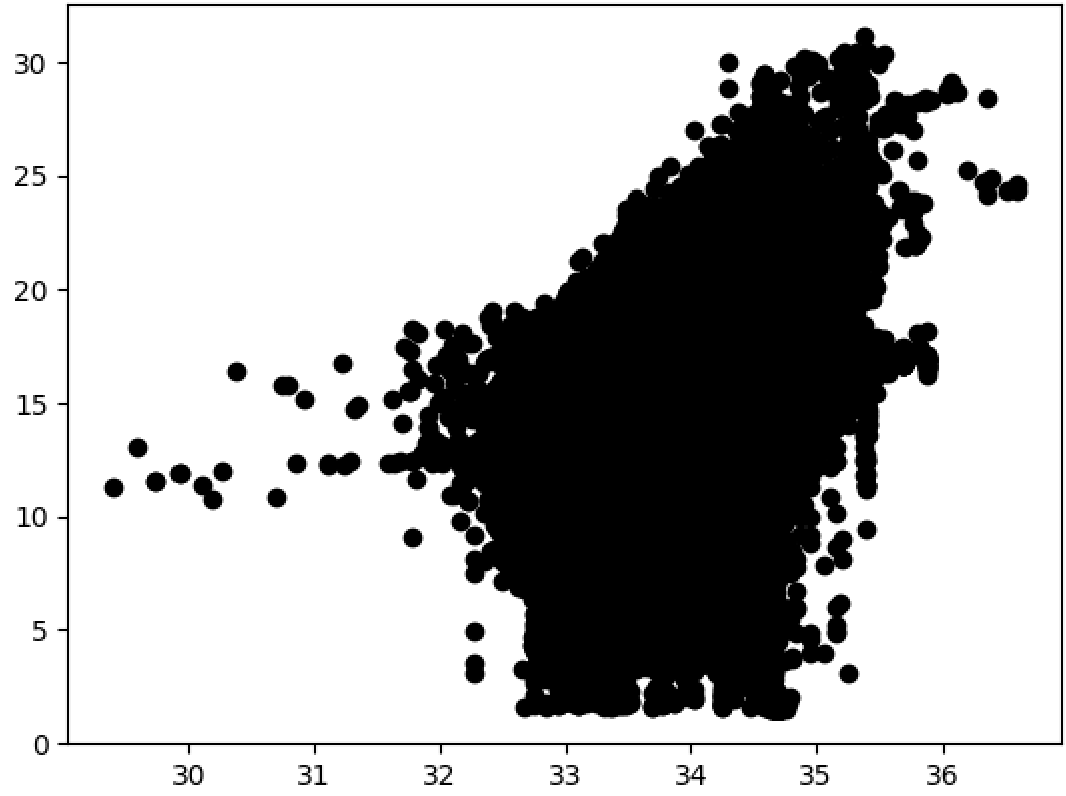
In [8]:

```
X_train,X_test,y_train,y_test = train_test_split(X, y, test_size = 0.25)
# Splitting the data into training data and test data
regr = LinearRegression()
regr.fit(X_train, y_train)
print(regr.score(X_test, y_test))
```

```
0.20261084321690104
```

In [9]:

```
#step-6: Exploring Our Results
y_pred = regr.predict(X_test)
plt.scatter(X_test, y_test, color = 'k')
plt.show()
# Data scatter of predicted values
```

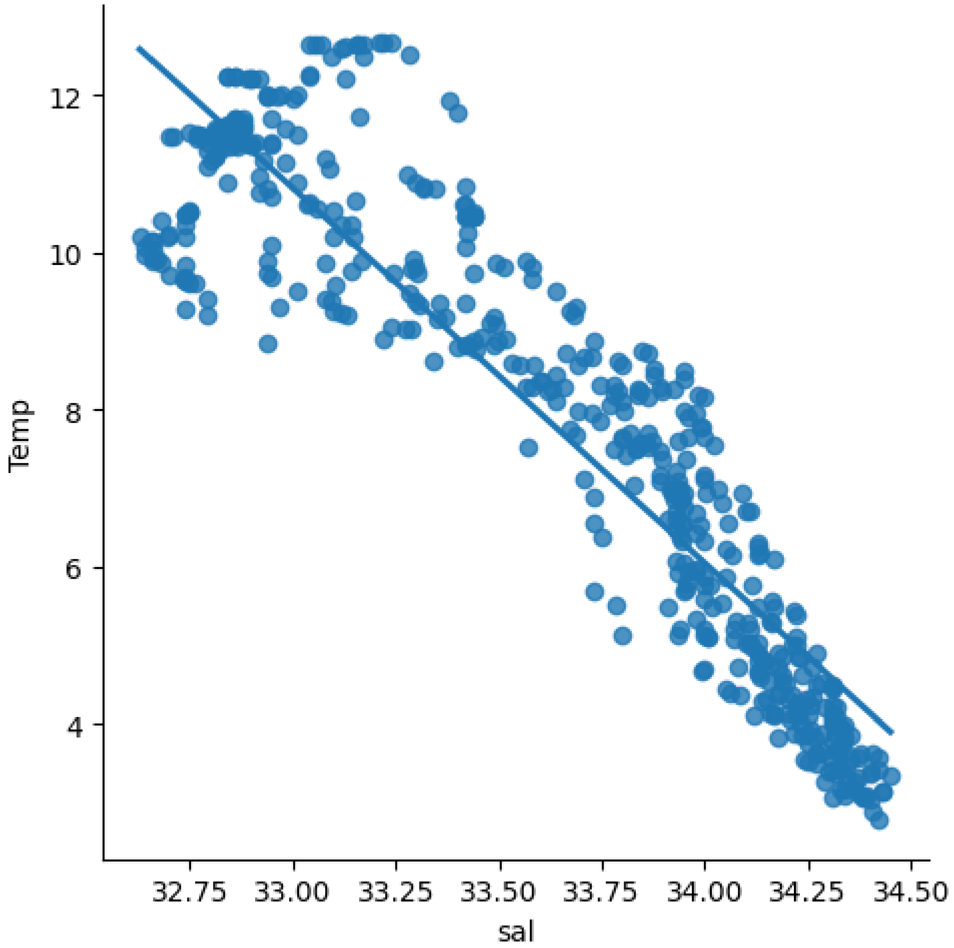


In [10]:

```
# Step-7: Working with a smaller Dataset
df500 = df[:][:500]
# Selecting the 1st 500 rows of the data
sns.lmplot(x = "sal", y = "Temp", data = df500, order = 1, ci = None)
```

Out[10]:

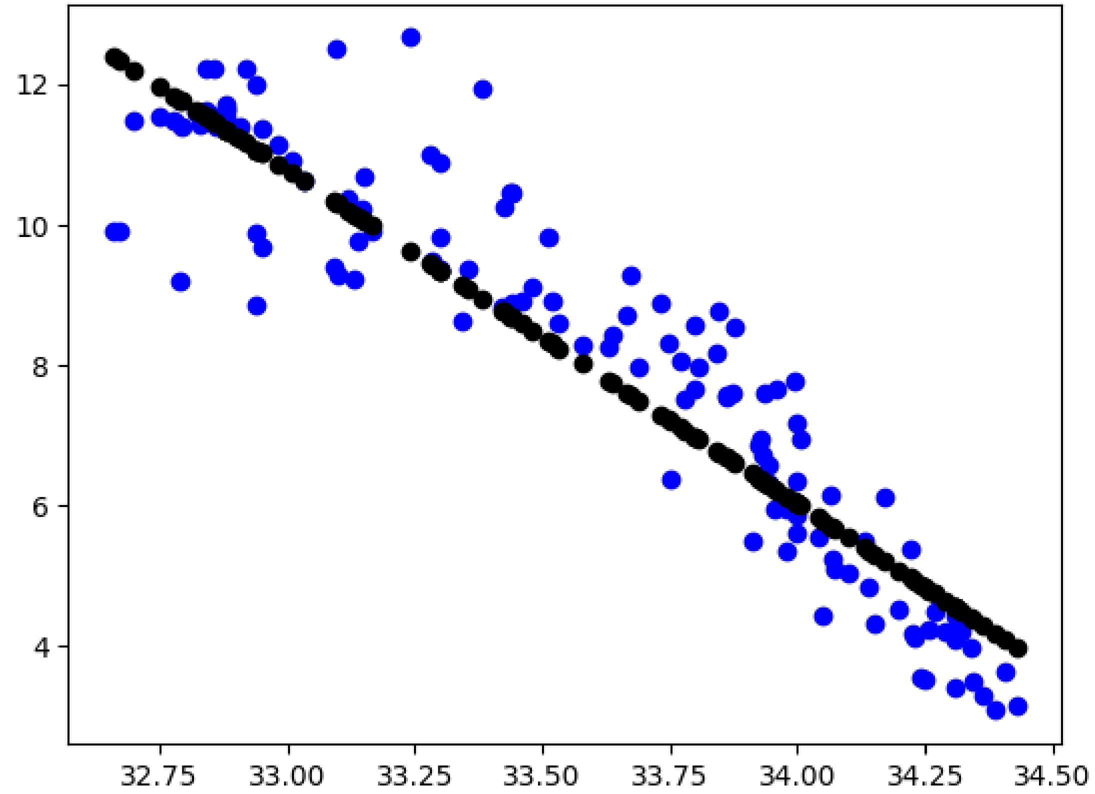
```
<seaborn.axisgrid.FacetGrid at 0x2692a651290>
```



In [11]:

```
df500.fillna(method = 'ffill', inplace = True)
X = np.array(df500['sal']).reshape(-1, 1)
y = np.array(df500['Temp']).reshape(-1, 1)
df500.dropna(inplace = True)
X_train, X_test, y_train, y_test = train_test_split(X, y, test_size = 0.25)
regr = LinearRegression()
regr.fit(X_train, y_train)
print("Regression:",regr.score(X_test, y_test))
y_pred = regr.predict(X_test)
plt.scatter(X_test, y_test, color = 'b')
plt.scatter(X_test, y_pred, color = 'k')
plt.show()
```

```
Regression: 0.8596803793967002
```



In [12]:

```
#Step-8: Evaluation of model

from sklearn.linear_model import LinearRegression

from sklearn.metrics import r2_score

#Train the model

model = LinearRegression()

model.fit(X_train, y_train)

#Evaluating the model on the test set

y_pred = model.predict(X_test)

r2 = r2_score(y_test, y_pred)

print("R2 score:",r2)
```

```
R2 score: 0.8596803793967002
```

```
#step9:conclusion
Dataset we have taken is poor for Linear Model,but with the smaller data works well
with Linear Model.
```

In [ ]:

```

```