In [1]:
```
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]:
```
df=pd.read_csv(r"C:\Users\yasoda\Downloads\bottle.csv (1).zip")
df
```

```
C:\Users\yasoda\AppData\Local\Temp\ipykernel_220\1835634272.py:1: DtypeWarning: Columns (47,73) have mixed types. Sp
ecify dtype option on import or set low_memory=False.
  df=pd.read_csv(r"C:\Users\yasoda\Downloads\bottle.csv (1).zip")
```

Out[2]:

	Cst_Cnt	Btl_Cnt	Sta_ID	Depth_ID	Depthm	T_degC	Salnty	O2ml_L	STheta	O2Sat	...	R_PHAEO	R_PRES	R_SAMP	DIC1	DIC2
0	1	1	054.0 056.0	19-4903CR-HY-060-0930-05400560-0000A-3	0	10.500	33.4400	NaN	25.64900	NaN	...	NaN	0	NaN	NaN	NaN
1	1	2	054.0 056.0	19-4903CR-HY-060-0930-05400560-0008A-3	8	10.460	33.4400	NaN	25.65600	NaN	...	NaN	8	NaN	NaN	NaN
2	1	3	054.0 056.0	19-4903CR-HY-060-0930-05400560-0010A-7	10	10.460	33.4370	NaN	25.65400	NaN	...	NaN	10	NaN	NaN	NaN
3	1	4	054.0 056.0	19-4903CR-HY-060-0930-05400560-0019A-3	19	10.450	33.4200	NaN	25.64300	NaN	...	NaN	19	NaN	NaN	NaN
4	1	5	054.0 056.0	19-4903CR-HY-060-0930-05400560-0020A-7	20	10.450	33.4210	NaN	25.64300	NaN	...	NaN	20	NaN	NaN	NaN
...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
864858	34404	864859	093.4 026.4	20-1611SR-MX-310-2239-09340264-0000A-7	0	18.744	33.4083	5.805	23.87055	108.74	...	0.18	0	NaN	NaN	NaN

	Cst_Cnt	Btl_Cnt	Sta_ID	Depth_ID	Depthm	T_degC	Salnty	O2ml_L	STheta	O2Sat	...	R_PHAEO	R_PRES	R_SAMP	DIC1	DIC2
864859	34404	864860	093.4 026.4	20-1611SR-MX-310-2239-09340264-0002A-3	2	18.744	33.4083	5.805	23.87072	108.74	...	0.18	2	4.0	NaN	NaN
864860	34404	864861	093.4 026.4	20-1611SR-MX-310-2239-09340264-0005A-3	5	18.692	33.4150	5.796	23.88911	108.46	...	0.18	5	3.0	NaN	NaN
864861	34404	864862	093.4 026.4	20-1611SR-MX-310-2239-09340264-0010A-3	10	18.161	33.4062	5.816	24.01426	107.74	...	0.31	10	2.0	NaN	NaN
864862	34404	864863	093.4 026.4	20-1611SR-MX-310-2239-09340264-0015A-3	15	17.533	33.3880	5.774	24.15297	105.66	...	0.61	15	1.0	NaN	NaN

864863 rows × 74 columns

In [3]:
```
df=df[['Salnty','T_degC']]
df.columns=['Sal','Temp']
```

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

```
<class 'pandas.core.frame.DataFrame'>
RangeIndex: 864863 entries, 0 to 864862
Data columns (total 2 columns):
 #   Column  Non-Null Count   Dtype  
---  ------  --------------   -----  
 0   Sal     817509 non-null  float64
 1   Temp    853900 non-null  float64
dtypes: float64(2)
memory usage: 13.2 MB
```

In [5]:
```
df.head(10)
```

Out[5]:

	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
5	33.431	10.45
6	33.440	10.45
7	33.424	10.24
8	33.420	10.06
9	33.494	9.86

In [6]:
```
df.fillna(10)
```

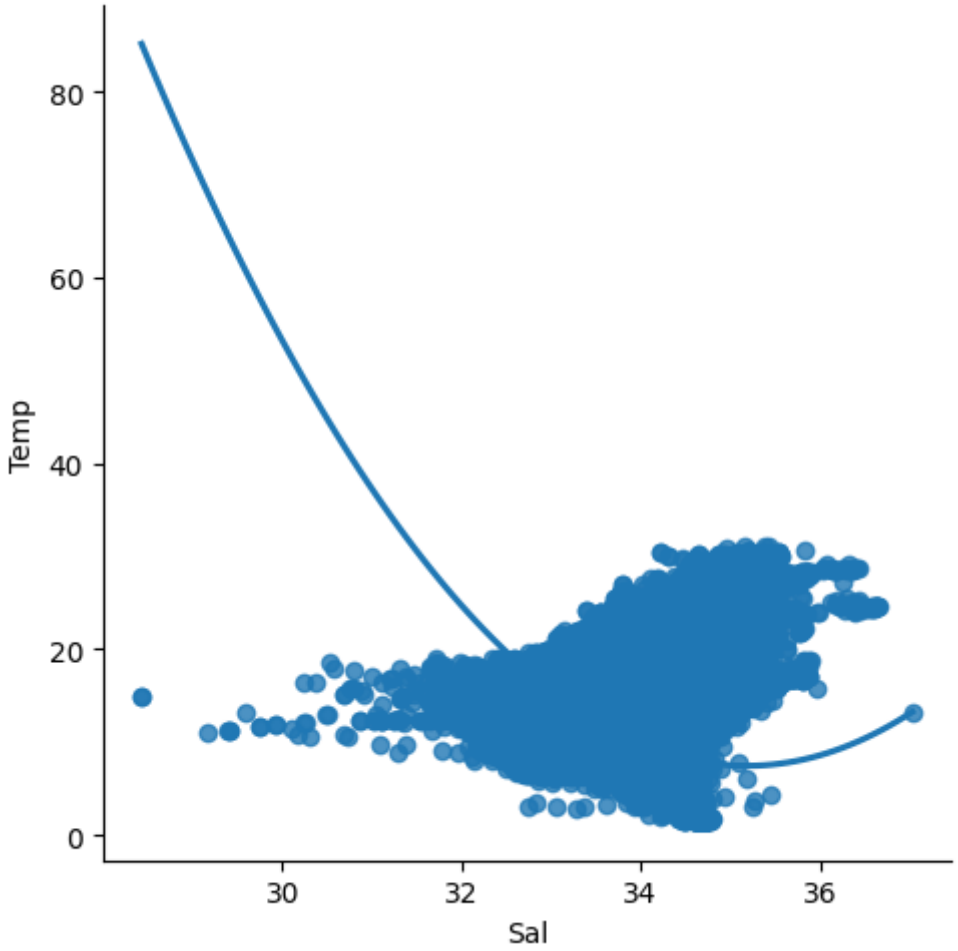
Out[6]:

	Sal	Temp
0	33.4400	10.500
1	33.4400	10.460
2	33.4370	10.460
3	33.4200	10.450
4	33.4210	10.450
...	...	...
864858	33.4083	18.744
864859	33.4083	18.744
864860	33.4150	18.692
864861	33.4062	18.161
864862	33.3880	17.533

864863 rows × 2 columns

In [7]:
```
sns.lmplot(x='Sal',y='Temp',data=df,order=2,ci=None)
```

Out[7]:
```
<seaborn.axisgrid.FacetGrid at 0x1c4628a69b0>
```



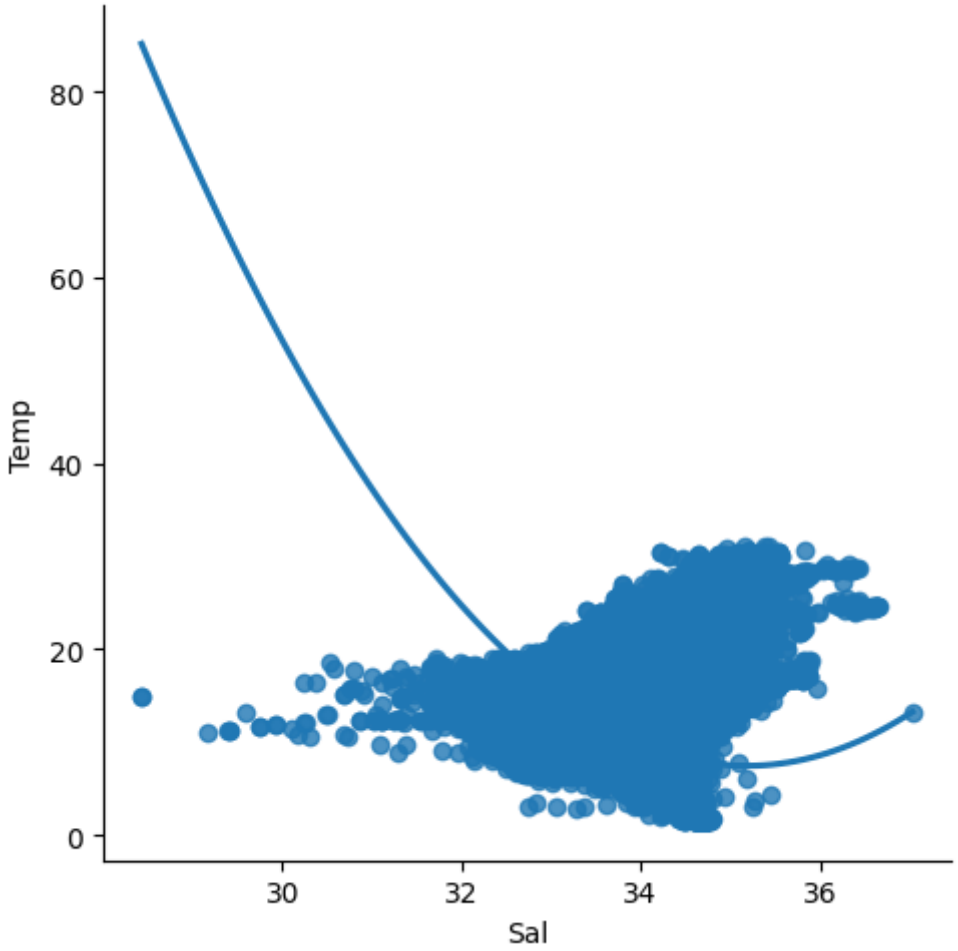
In [8]:
```
df.describe()
```

Out[8]:

	Sal	Temp
count	817509.000000	853900.000000
mean	33.840350	10.799677
std	0.461843	4.243825
min	28.431000	1.440000
25%	33.488000	7.680000
50%	33.863000	10.060000
75%	34.196900	13.880000
max	37.034000	31.140000

In [9]:
```
sns.lmplot(x="Sal",y="Temp",data=df,order=2,ci=None)
```

Out[9]:
```
<seaborn.axisgrid.FacetGrid at 0x1c409763250>
```



In [14]:
```
x = np.array(df['Sal']).reshape(-1, 1)
y = np.array(df['Temp']).reshape(-1, 1)
```

In [15]:
```
df.dropna(inplace = True)
```

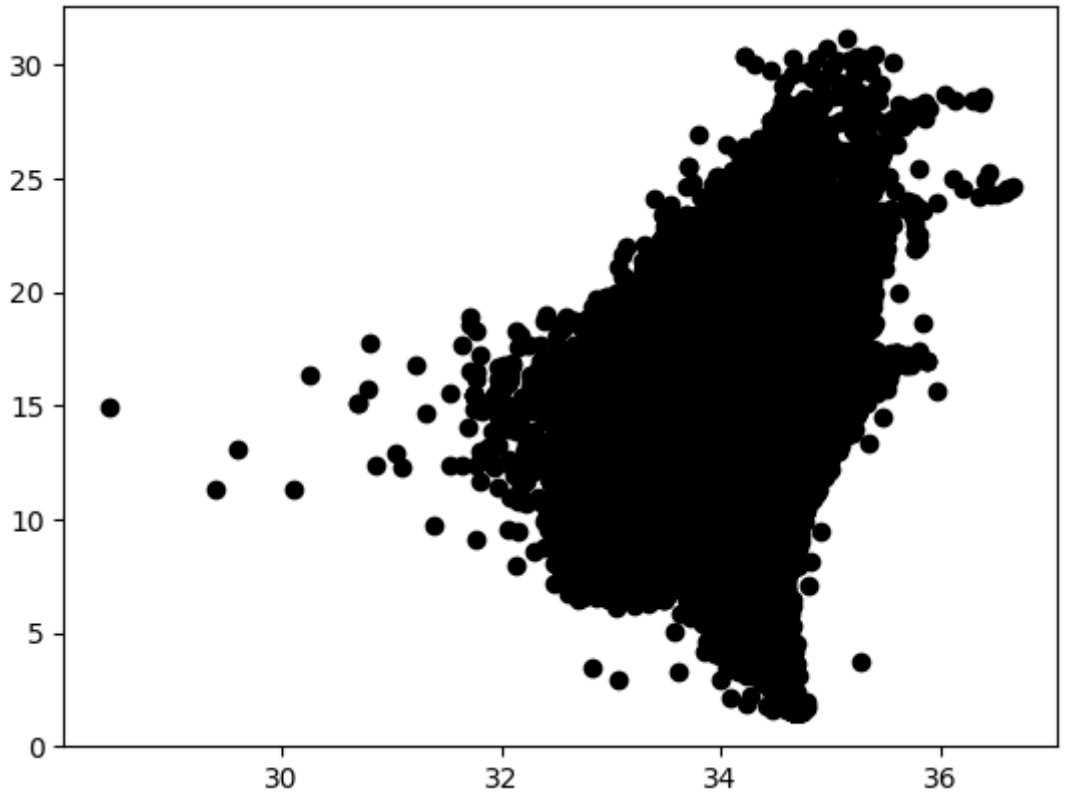
```
C:\Users\yasoda\AppData\Local\Temp\ipykernel_220\1791587065.py:1: SettingWithCopyWarning:
A value is trying to be set on a copy of a slice from a DataFrame

See the caveats in the documentation: https://pandas.pydata.org/pandas-docs/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.dropna(inplace = True)
```

In [16]:
```
X_train,X_test,Y_train,Y_test = train_test_split(x,y,test_size = 0.25)
```

In [22]:
```
regr = LinearRegression()
regr.fit(X_train,Y_train)
print(regr.score(X_test,Y_test))
```

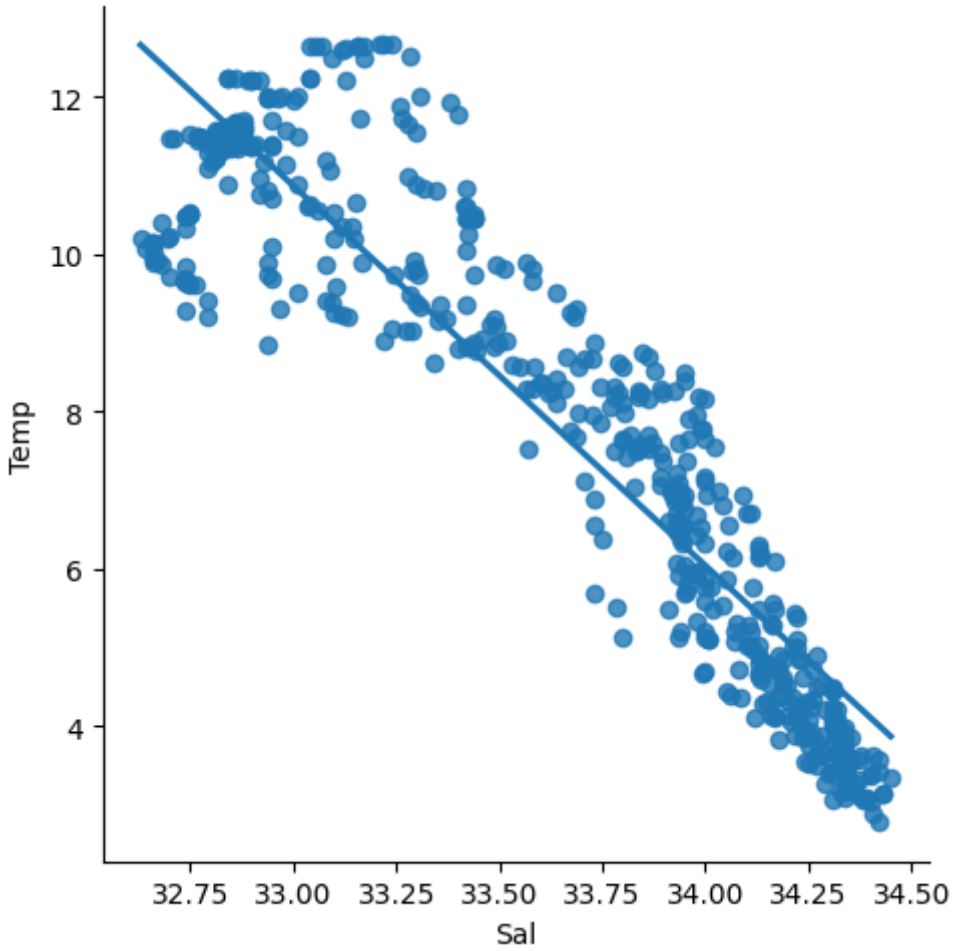
```
0.2567659345483597
```

In [28]:
```
#Exploring our Results
Y_pred = regr.predict(X_test)
plt.scatter(X_test,Y_test, color = 'k')
plt.show()
```



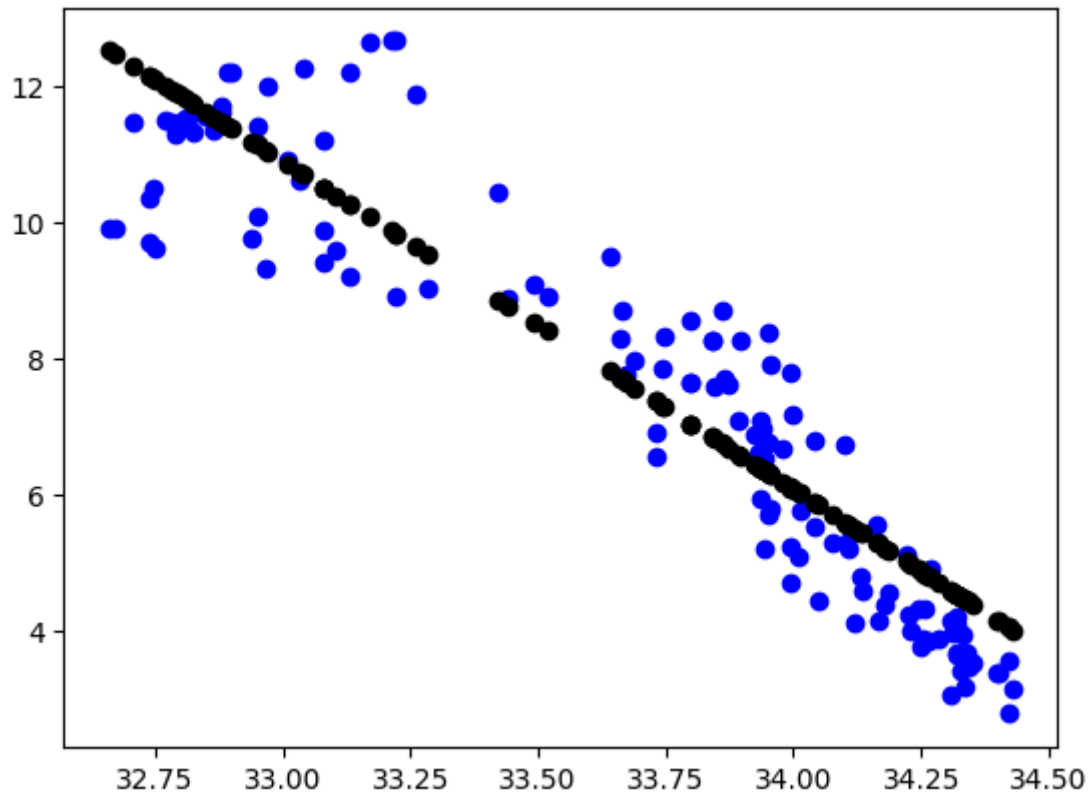
In [19]:
```
#Step-7: working with a smaller Dataset
df500 = df[:][:500]
#Selecting the 1st 500 rows of the data
sns.lmplot(x= "Sal",y = "Temp",data = df500, order = 1,ci = None)
```

Out[19]: <seaborn.axisgrid.FacetGrid at 0x1c40f91acb0>



In [29]:
```
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: 0.8558214186132491
```



In [30]:
```
from sklearn.linear_model import LinearRegression
from sklearn.metrics import r2_score
```

In [31]:
```
model = LinearRegression()

model.fit(X_train, y_train)
```

Out[31]:
```
▾ LinearRegression

LinearRegression()
```

In [32]:
```
#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: 0.8558214186132491
```