

This is the traffic volume data for Minneapolis-St Paul, MN westbound I-94. There are no missing values in this dataset so no need to make assumptions for it.

In [1]:

```
# https://archive.ics.uci.edu/ml/datasets/Metro+Interstate+Traffic+Volume

path = 'Metro_Interstate_Traffic_Volume.csv'
f = open(path, 'r')
```

In [2]:

```
dataset = []
header = f.readline().strip().split(',')
for line in f:
    line = line.split(',')
    dataset.append(line)
```

In [3]:

```
N = len(dataset)
N
```

Out[3]:

48204

In [4]:

```
header
```

Out[4]:

```
['holiday',
 'temp',
 'rain_1h',
 'snow_1h',
 'clouds_all',
 'weather_main',
 'weather_description',
 'date_time',
 'traffic_volume']
```

In [5]:

```
header.index('traffic_volume')
```

Out[5]:

8

In [6]:

```
header.index('temp')
```

Out[6]:

1

In [7]:

```
y = [float(d[1]) for d in dataset]
```

In [8]:

```
def feature(datum):  
    feat = [1, float(datum[8])]  
    return feat
```

In [9]:

```
X = [feature(d) for d in dataset]
```

In [10]:

```
X[:10]
```

Out[10]:

```
[[1, 5545.0],  
 [1, 4516.0],  
 [1, 4767.0],  
 [1, 5026.0],  
 [1, 4918.0],  
 [1, 5181.0],  
 [1, 5584.0],  
 [1, 6015.0],  
 [1, 5791.0],  
 [1, 4770.0]]
```

In [11]:

```
y[:10]
```

Out[11]:

```
[288.28, 289.36, 289.58, 290.13, 291.14, 291.72, 293.17, 293.86, 294.14, 293.1]
```

In [12]:

```
import numpy
theta, residuals, rank, s = numpy.linalg.lstsq(X, y)
```

<ipython-input-12-af50c4dbc7d9>:2: FutureWarning: `rcond` parameter will change to the default of machine precision times ``max(M, N)`` where M and N are the input matrix dimensions.
To use the future default and silence this warning we advise to pass `rcond=None`, to keep using the old, explicitly pass `rcond=-1`.

```
theta, residuals, rank, s = numpy.linalg.lstsq(X, y)
```

In [13]:

```
theta
```

Out[13]:

```
array([2.78354428e+02, 8.74724440e-04])
```

Our line of best fit for traffic prediction based on temp would be $\text{traffic} = 2.78354428e+02 + 8.74724440e-04 * \text{temp}$

In []:

Gradient Descent using tensorflow

In [14]:

```
path = 'Metro_Interstate_Traffic_Volume.csv'
f = open(path, 'r')

dataset = []
header = f.readline().strip().split(',')
for line in f:
    line = line.split(',')
    dataset.append(line)
```

In [15]:

```
import tensorflow as tf
```

```
/Library/Frameworks/Python.framework/Versions/3.8/lib/python3.8/site-  
-packages/tensorflow/python/framework/dtypes.py:523: FutureWarning:  
Passing (type, 1) or 'ltype' as a synonym of type is deprecated; in  
a future version of numpy, it will be understood as (type, (1,)) / '  
(1,)type'.
```

```
_np_qint8 = np.dtype([("qint8", np.int8, 1)])
```

```
/Library/Frameworks/Python.framework/Versions/3.8/lib/python3.8/site-  
-packages/tensorflow/python/framework/dtypes.py:524: FutureWarning:  
Passing (type, 1) or 'ltype' as a synonym of type is deprecated; in  
a future version of numpy, it will be understood as (type, (1,)) / '  
(1,)type'.
```

```
_np_quint8 = np.dtype([("quint8", np.uint8, 1)])
```

```
/Library/Frameworks/Python.framework/Versions/3.8/lib/python3.8/site-  
-packages/tensorflow/python/framework/dtypes.py:525: FutureWarning:  
Passing (type, 1) or 'ltype' as a synonym of type is deprecated; in  
a future version of numpy, it will be understood as (type, (1,)) / '  
(1,)type'.
```

```
_np_qint16 = np.dtype([("qint16", np.int16, 1)])
```

```
/Library/Frameworks/Python.framework/Versions/3.8/lib/python3.8/site-  
-packages/tensorflow/python/framework/dtypes.py:526: FutureWarning:  
Passing (type, 1) or 'ltype' as a synonym of type is deprecated; in  
a future version of numpy, it will be understood as (type, (1,)) / '  
(1,)type'.
```

```
_np_quint16 = np.dtype([("quint16", np.uint16, 1)])
```

```
/Library/Frameworks/Python.framework/Versions/3.8/lib/python3.8/site-  
-packages/tensorflow/python/framework/dtypes.py:527: FutureWarning:  
Passing (type, 1) or 'ltype' as a synonym of type is deprecated; in  
a future version of numpy, it will be understood as (type, (1,)) / '  
(1,)type'.
```

```
_np_qint32 = np.dtype([("qint32", np.int32, 1)])
```

```
/Library/Frameworks/Python.framework/Versions/3.8/lib/python3.8/site-  
-packages/tensorflow/python/framework/dtypes.py:532: FutureWarning:  
Passing (type, 1) or 'ltype' as a synonym of type is deprecated; in  
a future version of numpy, it will be understood as (type, (1,)) / '  
(1,)type'.
```

```
np_resource = np.dtype([("resource", np.ubyte, 1)])
```

```
<frozen importlib._bootstrap>:219: RuntimeWarning: compiletime versi  
on 3.6 of module 'tensorflow.python.framework.fast_tensor_util' does  
not match runtime version 3.8
```

```
<frozen importlib._bootstrap>:219: RuntimeWarning: builtins.type siz  
e changed, may indicate binary incompatibility. Expected 880, got 86
```

4

In [16]:

```
def feature(datum):  
    feat = [1, float(datum[8])]   
    return feat
```

In [17]:

```
y = [float(d[1]) for d in dataset]  
X = [feature(d) for d in dataset]
```

In [18]:

```
y = tf.constant(y, shape=[len(y),1])
```

In [19]:

```
K = len(X[0])  
K
```

Out[19]:

2

In [20]:

```
def MSE(X, y, theta):  
    return tf.reduce_mean((tf.matmul(X,theta) - y)**2)
```

In [21]:

```
theta = tf.Variable(tf.constant([0.0]*K, shape=[K,1]))
```

In [22]:

```
# stochastic gradient descent optimizer with learning rate of 0.01  
optimizer = tf.train.AdamOptimizer(0.01)
```

In [23]:

```
objective = MSE(X,y,theta)
```

In [24]:

```
train = optimizer.minimize(objective)
```

In [25]:

```
init = tf.global_variables_initializer()
```

In [26]:

```
sess = tf.Session()  
sess.run(init)
```

In [27]:

```
for iteration in range(1000):  
    cvalues = sess.run([train, objective])  
    print("objective = " + str(cvalues[1]))
```

```
objective = 79254.67  
objective = 62304.426  
objective = 48372.863  
objective = 37467.94  
objective = 29526.0  
objective = 24383.32  
objective = 21746.955  
objective = 21177.621  
objective = 22102.234  
objective = 23871.395  
objective = 25855.086  
objective = 27544.145  
objective = 28616.08  
objective = 28945.754  
objective = 28571.945  
objective = 27643.664  
objective = 26366.459  
objective = 24957.895  
objective = 23615.23  
objective = 22493.275  
objective = 21691.236  
objective = 21247.72  
objective = 21143.629  
objective = 21312.316  
objective = 21655.828  
objective = 22064.832  
objective = 22438.213  
objective = 22699.256  
objective = 22804.957  
objective = 22747.943  
objective = 22551.764  
objective = 22261.67  
objective = 21933.121  
objective = 21620.406
```

objective = 21367.32
objective = 21200.951
objective = 21129.186
objective = 21141.947
objective = 21215.533
objective = 21319.01
objective = 21421.234
objective = 21496.688
objective = 21529.867
objective = 21516.568
objective = 21463.066
objective = 21383.166
objective = 21294.205
objective = 21212.824
objective = 21151.768
objective = 21117.676
objective = 21110.627
objective = 21125.102
objective = 21152.004
objective = 21181.22
objective = 21203.9
objective = 21214.324
objective = 21210.598
objective = 21194.438
objective = 21170.346
objective = 21143.916
objective = 21120.559
objective = 21104.047
objective = 21096.041
objective = 21096.023
objective = 21101.62
objective = 21109.59
objective = 21116.715
objective = 21120.6
objective = 21120.05
objective = 21115.291
objective = 21107.58
objective = 21098.713
objective = 21090.564
objective = 21084.48
objective = 21081.156
objective = 21080.34
objective = 21081.318
objective = 21082.994
objective = 21084.25
objective = 21084.357
objective = 21082.975
objective = 21080.271
objective = 21076.791
objective = 21073.15

objective = 21069.922
objective = 21067.531
objective = 21066.035
objective = 21065.256
objective = 21064.883
objective = 21064.516
objective = 21063.83
objective = 21062.69
objective = 21061.053
objective = 21059.082
objective = 21057.014
objective = 21055.06
objective = 21053.348
objective = 21051.98
objective = 21050.828
objective = 21049.852
objective = 21048.838
objective = 21047.754
objective = 21046.494
objective = 21045.049
objective = 21043.525
objective = 21041.959
objective = 21040.463
objective = 21039.02
objective = 21037.742
objective = 21036.475
objective = 21035.28
objective = 21034.041
objective = 21032.793
objective = 21031.47
objective = 21030.111
objective = 21028.707
objective = 21027.303
objective = 21025.914
objective = 21024.578
objective = 21023.262
objective = 21021.979
objective = 21020.672
objective = 21019.4
objective = 21018.094
objective = 21016.725
objective = 21015.39
objective = 21014.018
objective = 21012.662
objective = 21011.32
objective = 21009.994
objective = 21008.682
objective = 21007.344
objective = 21006.02
objective = 21004.684

objective = 21003.371
objective = 21002.002
objective = 21000.664
objective = 20999.3
objective = 20997.965
objective = 20996.63
objective = 20995.262
objective = 20993.947
objective = 20992.62
objective = 20991.268
objective = 20989.922
objective = 20988.54
objective = 20987.184
objective = 20985.85
objective = 20984.527
objective = 20983.162
objective = 20981.791
objective = 20980.451
objective = 20979.098
objective = 20977.746
objective = 20976.38
objective = 20975.041
objective = 20973.662
objective = 20972.332
objective = 20970.957
objective = 20969.613
objective = 20968.242
objective = 20966.883
objective = 20965.504
objective = 20964.14
objective = 20962.791
objective = 20961.44
objective = 20960.057
objective = 20958.72
objective = 20957.344
objective = 20955.986
objective = 20954.592
objective = 20953.236
objective = 20951.857
objective = 20950.51
objective = 20949.143
objective = 20947.785
objective = 20946.395
objective = 20945.025
objective = 20943.629
objective = 20942.293
objective = 20940.9
objective = 20939.545
objective = 20938.164
objective = 20936.803

objective = 20935.42
objective = 20934.035
objective = 20932.656
objective = 20931.281
objective = 20929.91
objective = 20928.533
objective = 20927.152
objective = 20925.76
objective = 20924.389
objective = 20923.023
objective = 20921.635
objective = 20920.26
objective = 20918.86
objective = 20917.486
objective = 20916.102
objective = 20914.72
objective = 20913.334
objective = 20911.957
objective = 20910.562
objective = 20909.186
objective = 20907.781
objective = 20906.416
objective = 20905.025
objective = 20903.633
objective = 20902.246
objective = 20900.846
objective = 20899.482
objective = 20898.088
objective = 20896.701
objective = 20895.303
objective = 20893.916
objective = 20892.53
objective = 20891.139
objective = 20889.738
objective = 20888.352
objective = 20886.96
objective = 20885.578
objective = 20884.178
objective = 20882.799
objective = 20881.39
objective = 20880.031
objective = 20878.621
objective = 20877.227
objective = 20875.826
objective = 20874.443
objective = 20873.047
objective = 20871.637
objective = 20870.252
objective = 20868.834
objective = 20867.436

objective = 20866.041
objective = 20864.643
objective = 20863.258
objective = 20861.855
objective = 20860.45
objective = 20859.055
objective = 20857.662
objective = 20856.262
objective = 20854.867
objective = 20853.473
objective = 20852.045
objective = 20850.652
objective = 20849.258
objective = 20847.865
objective = 20846.451
objective = 20845.047
objective = 20843.656
objective = 20842.248
objective = 20840.863
objective = 20839.453
objective = 20838.031
objective = 20836.625
objective = 20835.22
objective = 20833.83
objective = 20832.412
objective = 20831.023
objective = 20829.62
objective = 20828.22
objective = 20826.8
objective = 20825.406
objective = 20823.979
objective = 20822.586
objective = 20821.16
objective = 20819.766
objective = 20818.357
objective = 20816.967
objective = 20815.562
objective = 20814.145
objective = 20812.727
objective = 20811.309
objective = 20809.918
objective = 20808.508
objective = 20807.113
objective = 20805.682
objective = 20804.273
objective = 20802.87
objective = 20801.453
objective = 20800.045
objective = 20798.63
objective = 20797.229

objective = 20795.822
objective = 20794.414
objective = 20792.992
objective = 20791.59
objective = 20790.168
objective = 20788.758
objective = 20787.342
objective = 20785.947
objective = 20784.543
objective = 20783.127
objective = 20781.709
objective = 20780.291
objective = 20778.865
objective = 20777.46
objective = 20776.053
objective = 20774.639
objective = 20773.213
objective = 20771.824
objective = 20770.387
objective = 20768.992
objective = 20767.58
objective = 20766.16
objective = 20764.734
objective = 20763.322
objective = 20761.9
objective = 20760.48
objective = 20759.08
objective = 20757.662
objective = 20756.248
objective = 20754.826
objective = 20753.398
objective = 20751.984
objective = 20750.564
objective = 20749.154
objective = 20747.725
objective = 20746.32
objective = 20744.902
objective = 20743.477
objective = 20742.06
objective = 20740.633
objective = 20739.234
objective = 20737.81
objective = 20736.4
objective = 20734.975
objective = 20733.55
objective = 20732.145
objective = 20730.703
objective = 20729.303
objective = 20727.863
objective = 20726.473

objective = 20725.062
objective = 20723.635
objective = 20722.203
objective = 20720.791
objective = 20719.373
objective = 20717.945
objective = 20716.516
objective = 20715.105
objective = 20713.69
objective = 20712.273
objective = 20710.836
objective = 20709.426
objective = 20707.994
objective = 20706.574
objective = 20705.145
objective = 20703.725
objective = 20702.303
objective = 20700.88
objective = 20699.459
objective = 20698.041
objective = 20696.629
objective = 20695.201
objective = 20693.78
objective = 20692.355
objective = 20690.93
objective = 20689.512
objective = 20688.09
objective = 20686.672
objective = 20685.238
objective = 20683.807
objective = 20682.4
objective = 20680.984
objective = 20679.557
objective = 20678.121
objective = 20676.71
objective = 20675.285
objective = 20673.857
objective = 20672.426
objective = 20671.02
objective = 20669.586
objective = 20668.174
objective = 20666.736
objective = 20665.322
objective = 20663.889
objective = 20662.467
objective = 20661.027
objective = 20659.611
objective = 20658.197
objective = 20656.768
objective = 20655.348

objective = 20653.924
objective = 20652.49
objective = 20651.072
objective = 20649.63
objective = 20648.203
objective = 20646.777
objective = 20645.354
objective = 20643.924
objective = 20642.508
objective = 20641.084
objective = 20639.637
objective = 20638.227
objective = 20636.809
objective = 20635.371
objective = 20633.94
objective = 20632.535
objective = 20631.1
objective = 20629.688
objective = 20628.246
objective = 20626.822
objective = 20625.385
objective = 20623.96
objective = 20622.53
objective = 20621.111
objective = 20619.684
objective = 20618.238
objective = 20616.826
objective = 20615.393
objective = 20613.963
objective = 20612.537
objective = 20611.098
objective = 20609.697
objective = 20608.262
objective = 20606.838
objective = 20605.39
objective = 20603.959
objective = 20602.533
objective = 20601.107
objective = 20599.686
objective = 20598.26
objective = 20596.826
objective = 20595.398
objective = 20593.98
objective = 20592.543
objective = 20591.123
objective = 20589.678
objective = 20588.258
objective = 20586.836
objective = 20585.412
objective = 20583.967

objective = 20582.547
objective = 20581.115
objective = 20579.684
objective = 20578.254
objective = 20576.82
objective = 20575.4
objective = 20573.97
objective = 20572.527
objective = 20571.113
objective = 20569.686
objective = 20568.244
objective = 20566.816
objective = 20565.393
objective = 20563.953
objective = 20562.537
objective = 20561.102
objective = 20559.678
objective = 20558.256
objective = 20556.83
objective = 20555.395
objective = 20553.953
objective = 20552.531
objective = 20551.11
objective = 20549.678
objective = 20548.252
objective = 20546.82
objective = 20545.38
objective = 20543.951
objective = 20542.521
objective = 20541.098
objective = 20539.664
objective = 20538.232
objective = 20536.8
objective = 20535.379
objective = 20533.926
objective = 20532.494
objective = 20531.082
objective = 20529.63
objective = 20528.213
objective = 20526.78
objective = 20525.355
objective = 20523.92
objective = 20522.475
objective = 20521.057
objective = 20519.623
objective = 20518.197
objective = 20516.773
objective = 20515.35
objective = 20513.908
objective = 20512.475

objective = 20511.03
objective = 20509.613
objective = 20508.182
objective = 20506.754
objective = 20505.309
objective = 20503.879
objective = 20502.467
objective = 20501.016
objective = 20499.59
objective = 20498.154
objective = 20496.717
objective = 20495.285
objective = 20493.85
objective = 20492.432
objective = 20491.008
objective = 20489.562
objective = 20488.14
objective = 20486.705
objective = 20485.266
objective = 20483.846
objective = 20482.41
objective = 20480.973
objective = 20479.547
objective = 20478.111
objective = 20476.695
objective = 20475.234
objective = 20473.814
objective = 20472.373
objective = 20470.945
objective = 20469.502
objective = 20468.076
objective = 20466.66
objective = 20465.22
objective = 20463.799
objective = 20462.348
objective = 20460.928
objective = 20459.484
objective = 20458.057
objective = 20456.63
objective = 20455.186
objective = 20453.766
objective = 20452.322
objective = 20450.908
objective = 20449.465
objective = 20448.041
objective = 20446.621
objective = 20445.191
objective = 20443.756
objective = 20442.314
objective = 20440.883

objective = 20439.45
objective = 20438.004
objective = 20436.578
objective = 20435.158
objective = 20433.727
objective = 20432.295
objective = 20430.848
objective = 20429.416
objective = 20427.99
objective = 20426.555
objective = 20425.133
objective = 20423.672
objective = 20422.26
objective = 20420.818
objective = 20419.385
objective = 20417.963
objective = 20416.52
objective = 20415.092
objective = 20413.664
objective = 20412.238
objective = 20410.799
objective = 20409.363
objective = 20407.926
objective = 20406.494
objective = 20405.074
objective = 20403.633
objective = 20402.205
objective = 20400.77
objective = 20399.344
objective = 20397.916
objective = 20396.482
objective = 20395.043
objective = 20393.617
objective = 20392.174
objective = 20390.764
objective = 20389.326
objective = 20387.893
objective = 20386.453
objective = 20385.014
objective = 20383.59
objective = 20382.156
objective = 20380.727
objective = 20379.283
objective = 20377.854
objective = 20376.418
objective = 20374.992
objective = 20373.57
objective = 20372.11
objective = 20370.693
objective = 20369.246

objective = 20367.828
objective = 20366.412
objective = 20364.97
objective = 20363.55
objective = 20362.088
objective = 20360.66
objective = 20359.213
objective = 20357.8
objective = 20356.361
objective = 20354.938
objective = 20353.502
objective = 20352.07
objective = 20350.64
objective = 20349.205
objective = 20347.775
objective = 20346.344
objective = 20344.896
objective = 20343.47
objective = 20342.035
objective = 20340.613
objective = 20339.19
objective = 20337.75
objective = 20336.316
objective = 20334.879
objective = 20333.443
objective = 20332.021
objective = 20330.578
objective = 20329.148
objective = 20327.719
objective = 20326.287
objective = 20324.857
objective = 20323.422
objective = 20321.975
objective = 20320.559
objective = 20319.113
objective = 20317.688
objective = 20316.256
objective = 20314.824
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objective = 20310.535
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objective = 20307.664
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objective = 20304.79
objective = 20303.377
objective = 20301.934
objective = 20300.498
objective = 20299.07
objective = 20297.643

objective = 20296.207
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objective = 20293.328
objective = 20291.912
objective = 20290.473
objective = 20289.055
objective = 20287.621
objective = 20286.193
objective = 20284.738
objective = 20283.314
objective = 20281.879
objective = 20280.459
objective = 20279.021
objective = 20277.582
objective = 20276.156
objective = 20274.71
objective = 20273.305
objective = 20271.863
objective = 20270.432
objective = 20268.996
objective = 20267.57
objective = 20266.139
objective = 20264.695
objective = 20263.266
objective = 20261.846
objective = 20260.4
objective = 20258.988
objective = 20257.553
objective = 20256.11
objective = 20254.686
objective = 20253.25
objective = 20251.844
objective = 20250.379
objective = 20248.955
objective = 20247.512
objective = 20246.084
objective = 20244.662
objective = 20243.215
objective = 20241.777
objective = 20240.348
objective = 20238.932
objective = 20237.508
objective = 20236.078
objective = 20234.645
objective = 20233.203
objective = 20231.771
objective = 20230.33
objective = 20228.89
objective = 20227.463
objective = 20226.055

objective = 20224.613
objective = 20223.184
objective = 20221.746
objective = 20220.324
objective = 20218.885
objective = 20217.451
objective = 20216.033
objective = 20214.586
objective = 20213.162
objective = 20211.74
objective = 20210.307
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objective = 20206.002
objective = 20204.584
objective = 20203.152
objective = 20201.717
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objective = 20197.416
objective = 20195.994
objective = 20194.543
objective = 20193.111
objective = 20191.684
objective = 20190.256
objective = 20188.83
objective = 20187.383
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objective = 20184.535
objective = 20183.104
objective = 20181.666
objective = 20180.223
objective = 20178.816
objective = 20177.371
objective = 20175.957
objective = 20174.51
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objective = 20170.213
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objective = 20164.512
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objective = 20161.637
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objective = 20158.791
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objective = 20155.932
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objective = 20151.63
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objective = 20147.334
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objective = 20143.047
objective = 20141.604
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objective = 20138.758
objective = 20137.318
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objective = 20133.037
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objective = 20130.176
objective = 20128.746
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objective = 20078.72
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objective = 20058.72
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objective = 20043.01
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objective = 20040.154
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objective = 20011.604

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objective = 20005.887
objective = 20004.469
objective = 20003.03
objective = 20001.607
objective = 20000.168
objective = 19998.754
objective = 19997.324
objective = 19995.914
objective = 19994.482
objective = 19993.053
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objective = 19990.195
objective = 19988.756
objective = 19987.336
objective = 19985.922
objective = 19984.494
objective = 19983.06
objective = 19981.633
objective = 19980.215
objective = 19978.783
objective = 19977.36
objective = 19975.932
objective = 19974.504
objective = 19973.074
objective = 19971.656
objective = 19970.232
objective = 19968.787
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objective = 19964.518
objective = 19963.09
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objective = 19944.541
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objective = 19941.7
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objective = 19931.717
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objective = 19910.355
objective = 19908.918
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objective = 19906.07
objective = 19904.668
objective = 19903.238
objective = 19901.809
objective = 19900.387
objective = 19898.963
objective = 19897.54
objective = 19896.11
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objective = 19893.275
objective = 19891.867
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objective = 19889.008
objective = 19887.574
objective = 19886.17
objective = 19884.734
objective = 19883.299
objective = 19881.879
objective = 19880.457
objective = 19879.035
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objective = 19874.764
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objective = 19871.924
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objective = 19869.078

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objective = 19861.945
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objective = 19857.688
objective = 19856.277
objective = 19854.854
objective = 19853.432
objective = 19852.021
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objective = 19849.162
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objective = 19843.477
objective = 19842.043
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objective = 19830.652
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objective = 19824.965
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objective = 19815.002
objective = 19813.59
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objective = 19810.754
objective = 19809.324
objective = 19807.906
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objective = 19805.059
objective = 19803.645
objective = 19802.219
objective = 19800.8
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objective = 19797.96

```
objective = 19796.537
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objective = 19793.7
objective = 19792.277
objective = 19790.86
objective = 19789.428
objective = 19788.016
objective = 19786.592
objective = 19785.182
objective = 19783.76
objective = 19782.334
objective = 19780.91
objective = 19779.486
objective = 19778.064
objective = 19776.646
objective = 19775.238
```

In [28]:

```
with sess.as_default():
    print(MSE(X,y,theta).eval())
    print(theta.eval())
```

```
19773.816
[[9.360891  ]
 [0.06104233]]
```

In []:

In [29]:

```
import matplotlib.pyplot as plt
```

In [30]:

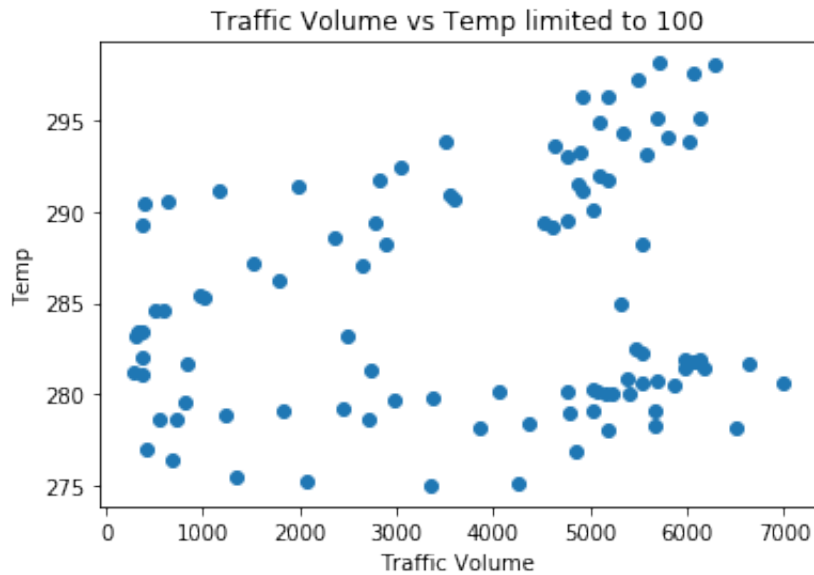
```
# y-axis
temp = [float(d[1]) for d in dataset]
# x-axis
traffic_volume = [float(d[8]) for d in dataset]
```

In [31]:

```
# first 100 points
plt.scatter(traffic_volume[:100], temp[:100])
plt.xlabel('Traffic Volume')
plt.ylabel("Temp")
plt.title("Traffic Volume vs Temp limited to 100")
```

Out[31]:

Text(0.5, 1.0, 'Traffic Volume vs Temp limited to 100')

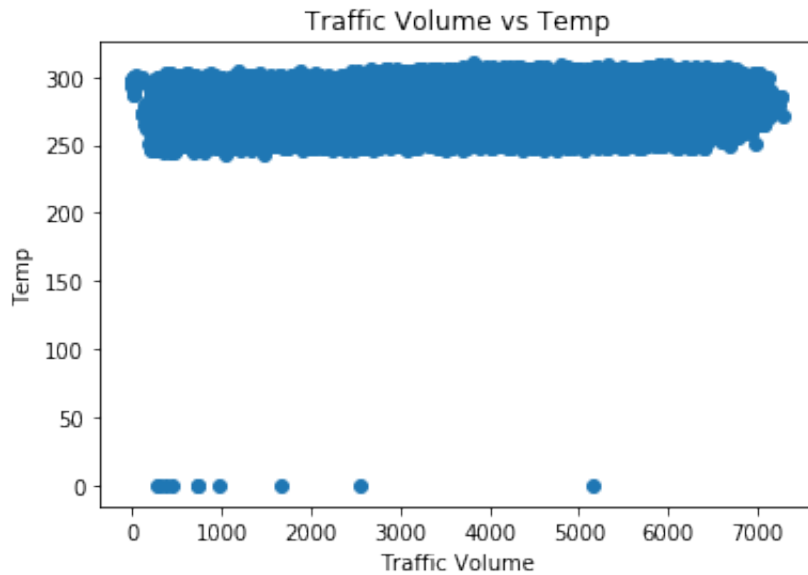


In [32]:

```
# all of the data points
plt.scatter(traffic_volume, temp)
plt.xlabel('Traffic Volume')
plt.ylabel("Temp")
plt.title("Traffic Volume vs Temp")
```

Out[32]:

Text(0.5, 1.0, 'Traffic Volume vs Temp')



In []: