Plots

September 3, 2017

1 Some plots and analysis of simulation data

```
In [102]: import pandas as pd
          import numpy as np
          import matplotlib.pyplot as plt
          import math
          %matplotlib inline
```

1.1 Simulation Parameters

```
In [249]: test_info = pd.read_csv("../data/backup/stats_mlfd/test_info.csv")
          test_info
```

Out[249]:

	test	workersCount	locationsCount	sampleSize	defaultMean	hbTimeout	randomMillis	geoFactor	crashProb	delta
0	mlfd_test	100	100	100	3000.0	4 seconds	200	100.0	0.001	NaN

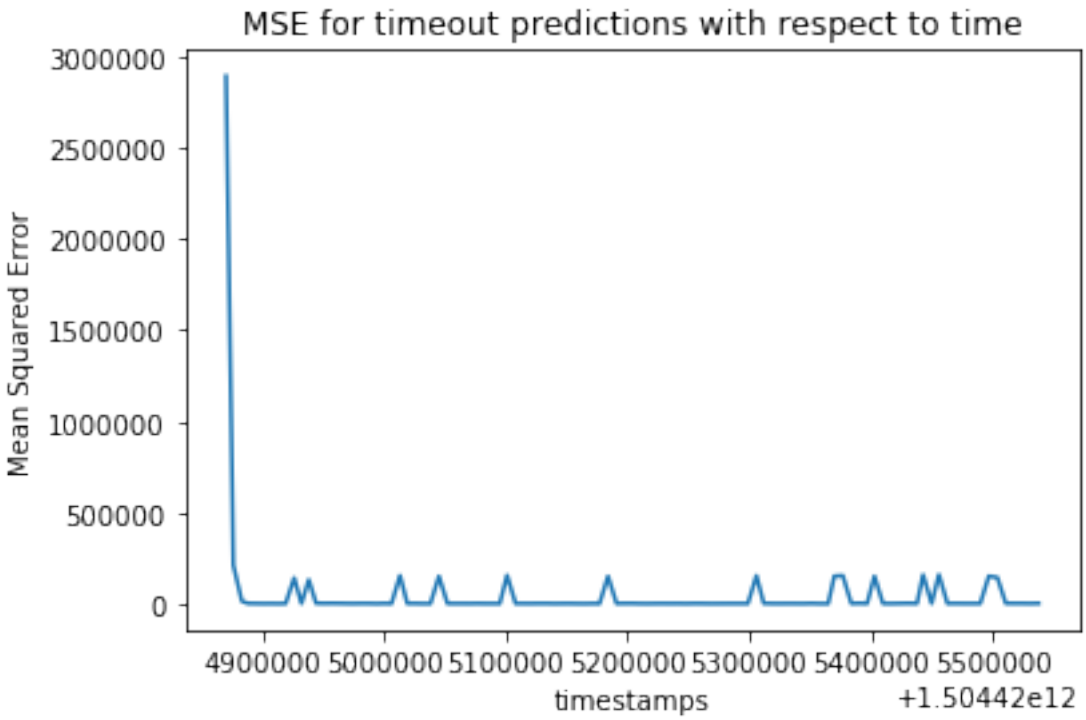
1.2 Prediction Evaluation of the Online-learner in the FD

```
In [104]: test_evaluations = pd.read_csv("../data/backup/stats_mlfd/testresults.csv")
          test_evaluations.head()
```

Out[104]:

	meanSquaredError	rootMeanSquaredError	rSquared	meanAbsoluteError	explainedVariance	timestamp
0	2.891005e+06	1700.295700	-0.815136	1418.753397	6.844245e+06	1504424870000
1	2.135465e+05	462.110885	0.974527	349.727503	1.041643e+07	1504424876000
2	1.632067e+04	127.752381	0.996729	105.777594	5.328207e+06	1504424883000
3	4.299215e+03	65.568400	0.999504	56.537756	8.820089e+06	1504424888000
4	3.624345e+03	60.202532	0.999099	48.894390	4.148113e+06	1504424895000

```
In [105]: time = test_evaluations["timestamp"].values
          mse = test_evaluations["meanSquaredError"].values
          plt.plot(time, mse)
          plt.ylabel('Mean Squared Error')
          plt.xlabel('timestamps')
          plt.title('MSE for timeout predictions with respect to time')
          plt.show()
```



1.3 RTT Distributions related to geographic location

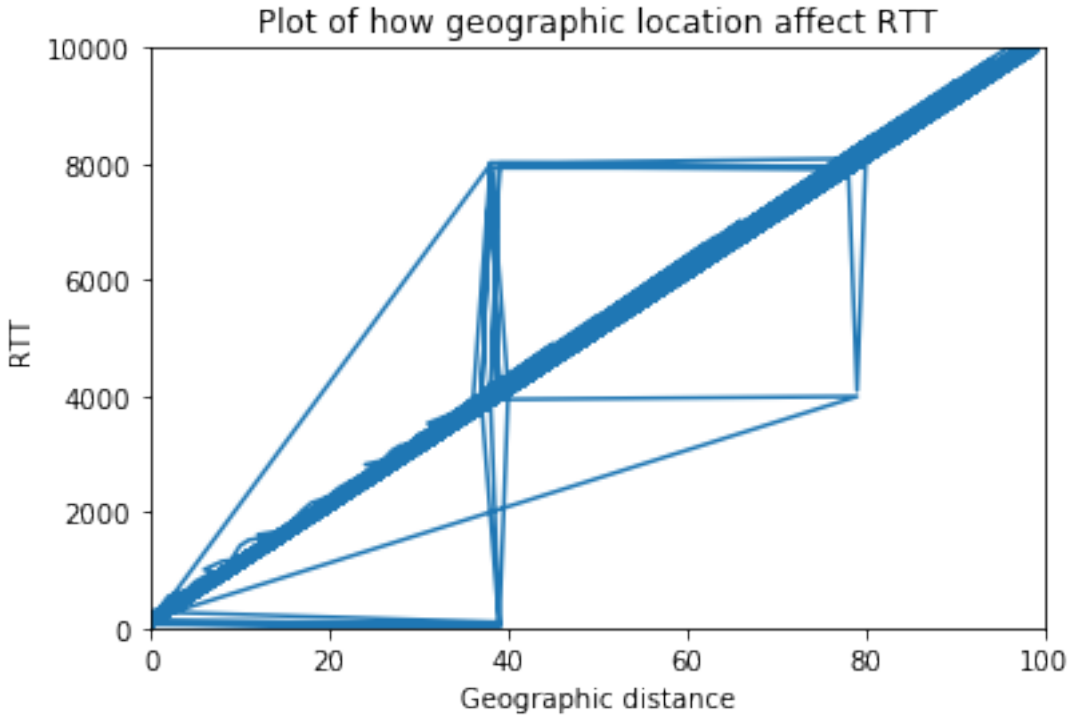
```
In [138]: rtt_data = pd.read_csv('../data/backup/stats_mlfd/rtt_data.csv')

In [139]: rtt_data.head()
```

Out[139]:

	node	geoLocation	rtt	timestamp	mean
0	100	0	270.0	1504424862481	270.0
1	1	1	338.0	1504424862550	338.0
2	2	2	548.0	1504424862760	548.0
3	3	3	599.0	1504424862811	599.0
4	4	4	648.0	1504424862860	648.0

```
In [140]: geo = rtt_data["geoLocation"].values
          rtt = rtt_data["rtt"].values
          plt.plot(geo, rtt)
```

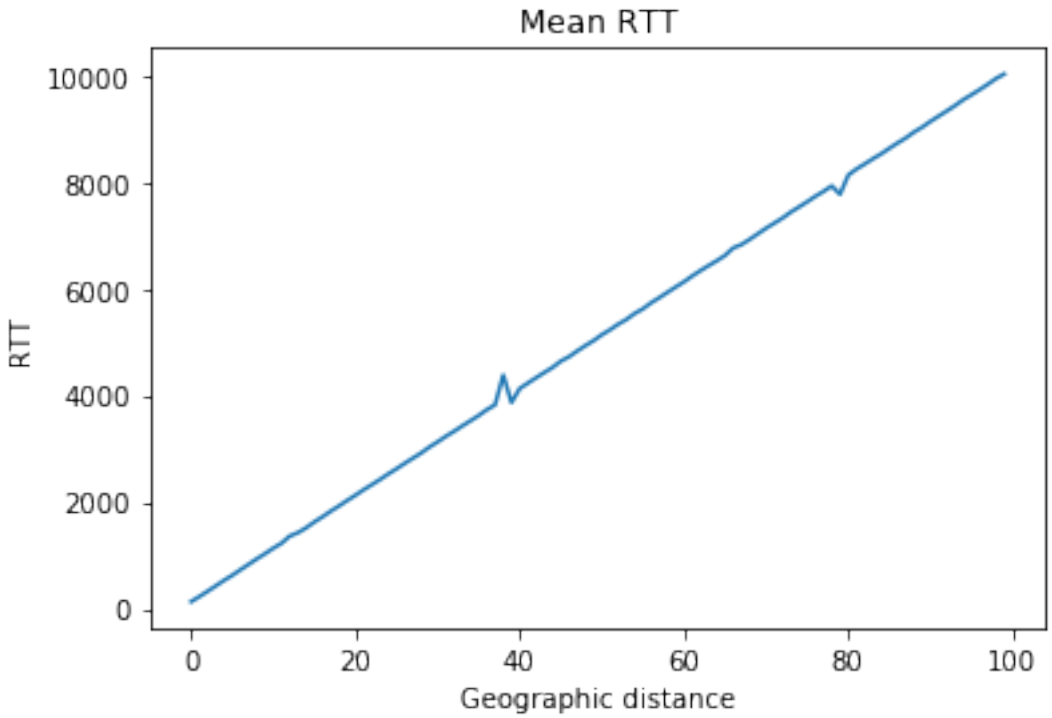
```
plt.axis([0, 100, 0, 10000])
plt.ylabel('RTT')
plt.xlabel('Geographic distance')
plt.title('Plot of how geographic location affect RTT')
plt.show()
```



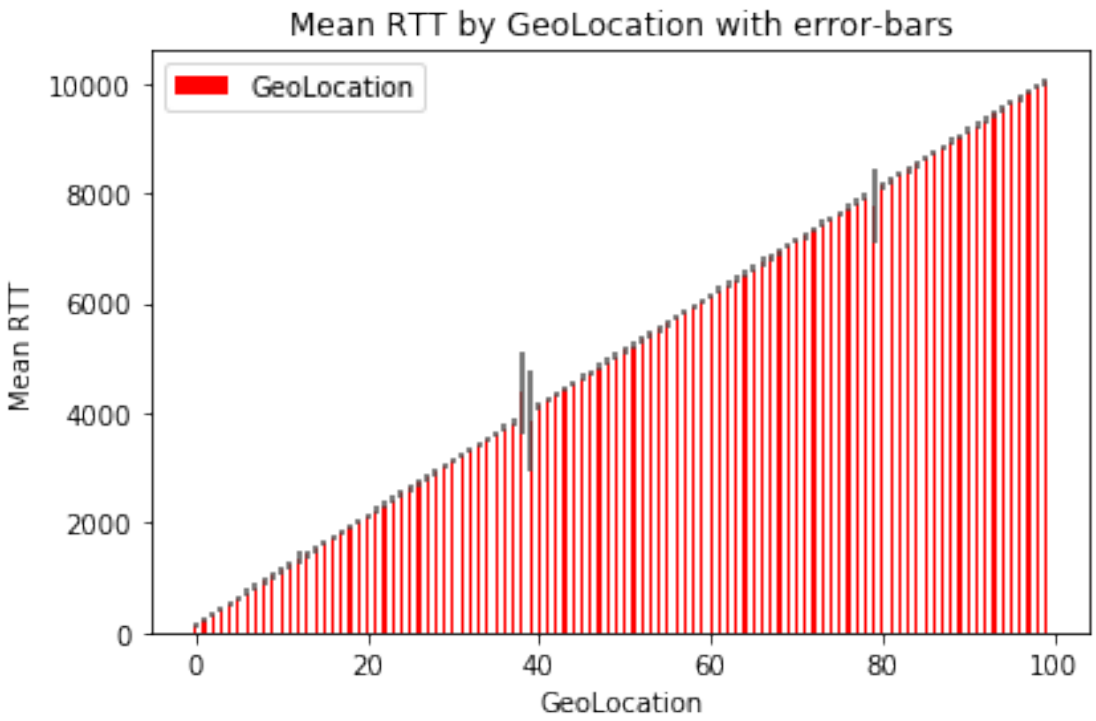

```
In [173]: rtt_data_with_mean = rtt_data.groupby(['geoLocation', 'rtt'], as_index=False).mean().g
          rtt_data_with_mean.head()

Out[173]: geoLocation
          0    131.860000
          1    226.456522
          2    325.627907
          3    427.609756
          4    530.630435
          Name: rtt, dtype: float64

In [246]: rtt_data_with_std = rtt_data.groupby('geoLocation')[['rtt']].std()
          rtt_data_with_std.head()

Out[246]:                    rtt
          geoLocation
          0            58.987944
          1            57.103708
```

```
2            61.323999
3            59.254465
4            60.819616
```

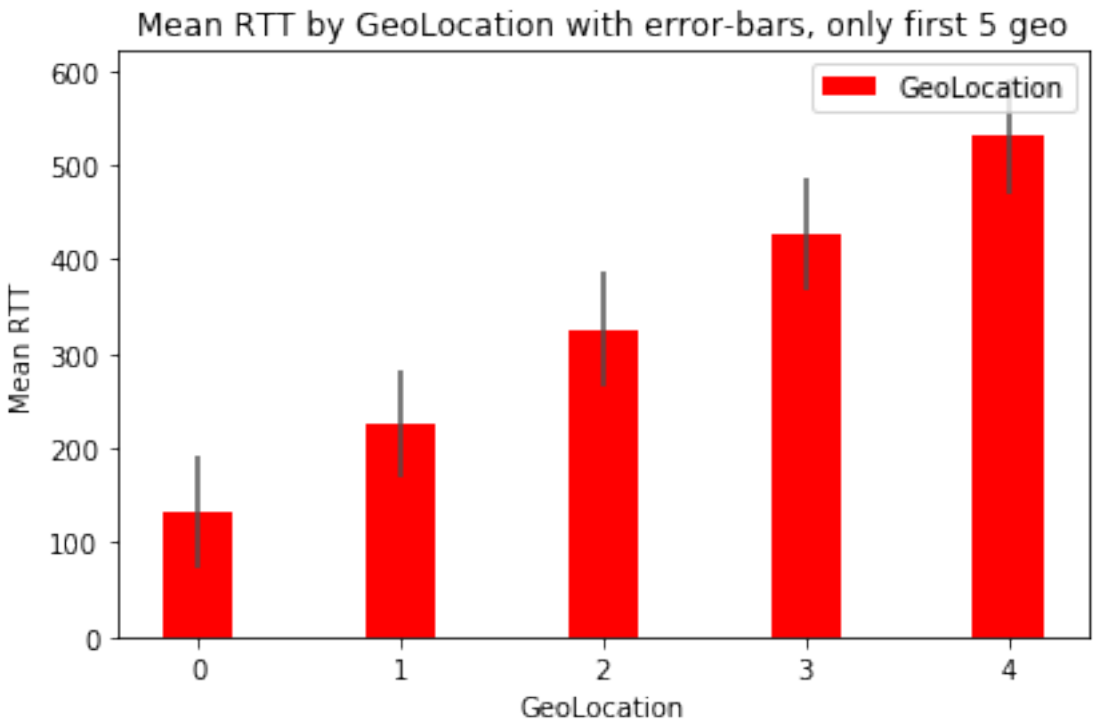
In [220]:
```
plt.plot(rtt_data_with_mean)
#plt.axis([0, 100, 0, 10000])
plt.ylabel('RTT')
plt.xlabel('Geographic distance')
plt.title('Mean RTT Plot by Geographic distance')
plt.show()
```



In [244]:
```
rtt = rtt_data_with_mean.values
std = rtt_data_with_std.values
l = len(rtt)
width = 0.35
error_config = {'ecolor': '0.3'}
plt.bar(range(len(rtt)), rtt, width=width, color='r', yerr=std, error_kw=error_config,
plt.xlabel('GeoLocation')
plt.ylabel('Mean RTT')
plt.title('Mean RTT by GeoLocation with error-bars')
plt.legend()
plt.tight_layout()
```

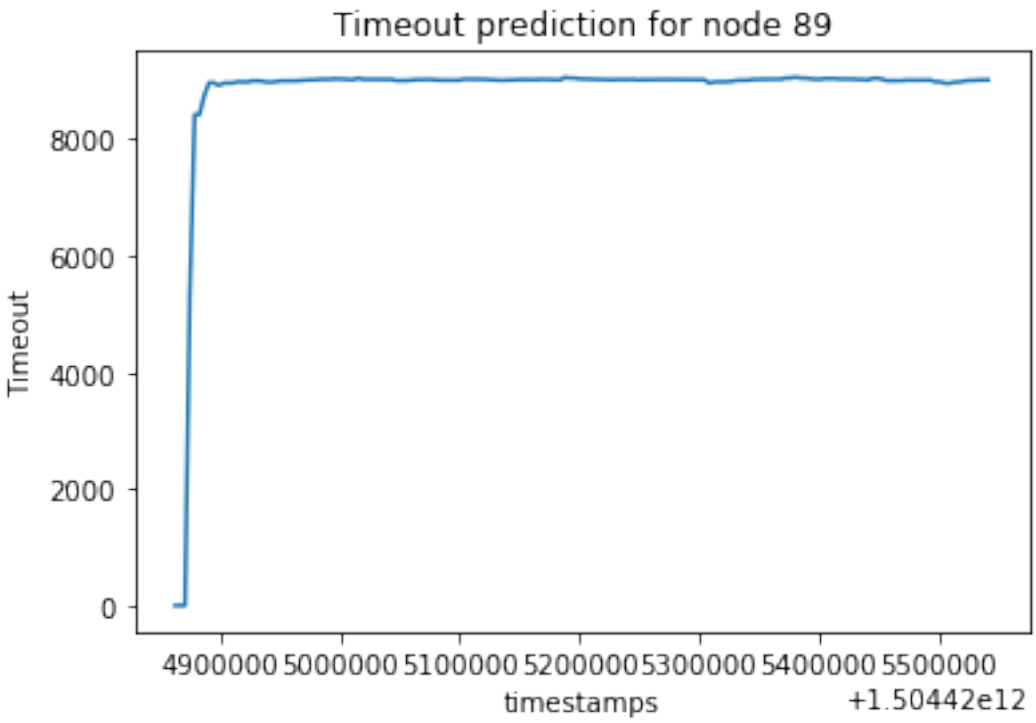



```
In [248]: rtt = rtt_data_with_mean.head().values
          std = rtt_data_with_std.head().values
          l = len(rtt)
          width = 0.35
          error_config = {'ecolor': '0.3'}
          plt.bar(range(len(rtt)), rtt, width=width, color='r', yerr=std, error_kw=error_config,
          plt.xlabel('GeoLocation')
          plt.ylabel('Mean RTT')
          plt.title('Mean RTT by GeoLocation with error-bars, only first 5 geo')
          plt.legend()
          plt.tight_layout()
```



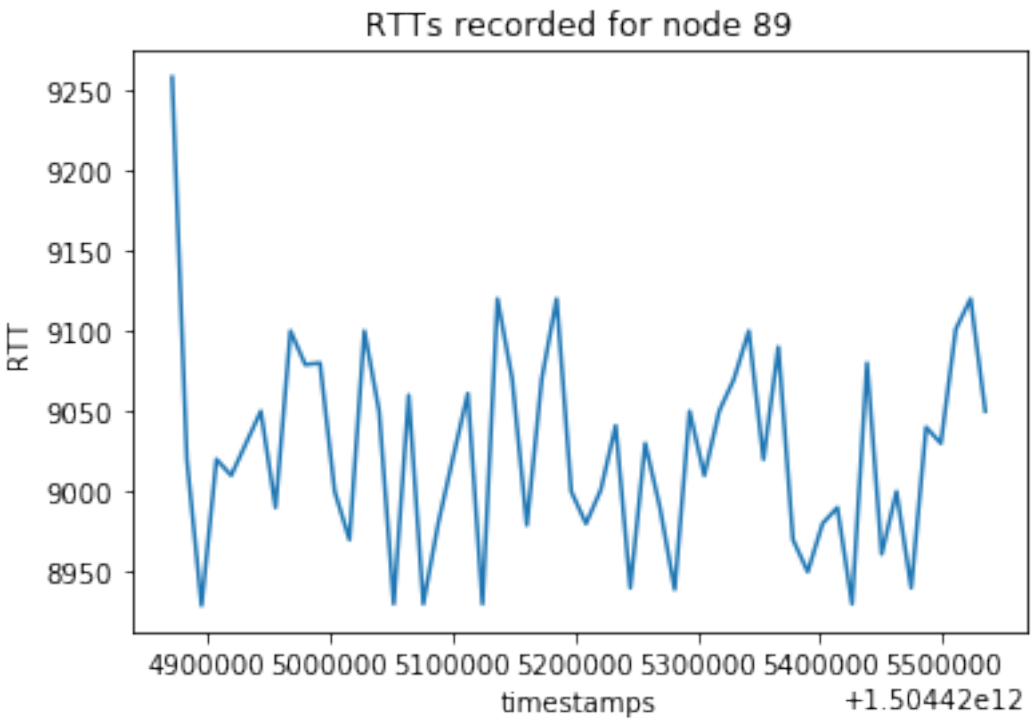
1.4 Predictions for a single Node

```
In [109]: prediction_data = pd.read_csv('../data/backup/stats_mlfd/prediction_data.csv')
          node89 = prediction_data.loc[prediction_data['node'] == 89]
          time = node89["timestamp"].values
          prediction = node89["prediction"].values
          plt.plot(time, prediction)
          plt.ylabel('Timeout')
          plt.xlabel('timestamps')
          plt.title('Timeout prediction for node 89')
          plt.show()
```



1.5 RTT-data for a single Node

```
In [110]: node89 = rtt_data.loc[rtt_data['node'] == 89]
          time = node89["timestamp"].values
          prediction = node89["rtt"].values
          plt.plot(time, prediction)
          plt.ylabel('RTT')
          plt.xlabel('timestamps')
          plt.title('RTTs recorded for node 89')
          plt.show()
```



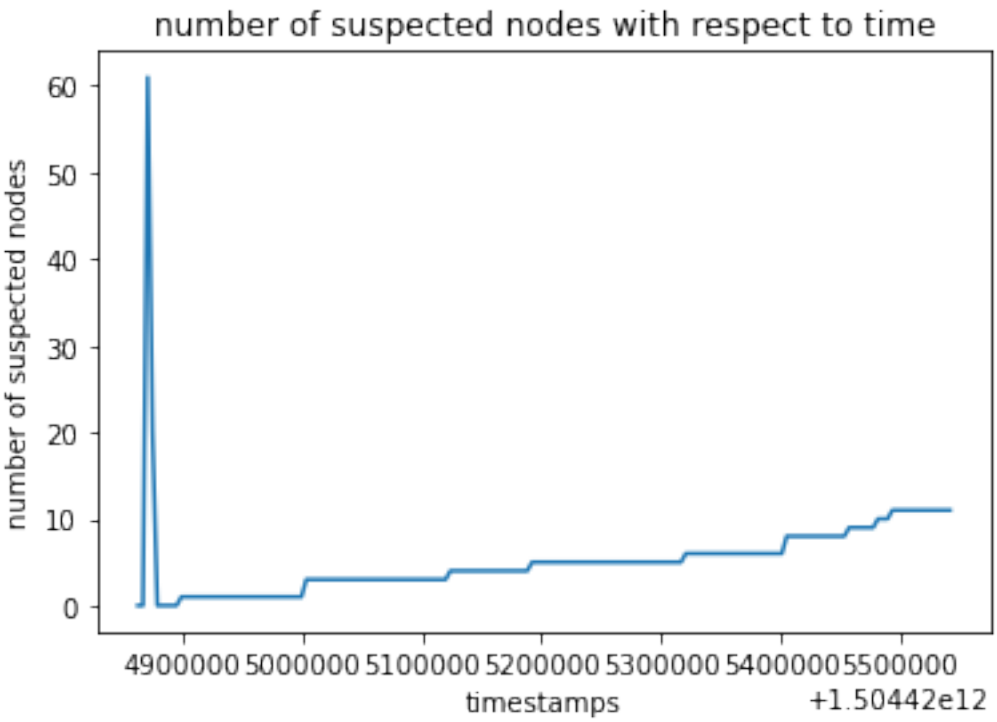
1.6 Analysis of number of suspected nodes with respect to time

```
In [111]: suspected_nodes_data = pd.read_csv('../data/backup/stats_mlfd/suspected_nodes.csv')
          suspected_nodes_data.head()
```

Out[111]:

	timestamp	numberOfSuspectedNodes
0	1504424862212	0
1	1504424866440	0
2	1504424870471	61
3	1504424874490	20
4	1504424878510	0

```
In [112]: time = suspected_nodes_data["timestamp"].values
          suspected = suspected_nodes_data["numberOfSuspectedNodes"].values
          plt.plot(time, suspected)
          plt.ylabel('number of suspected nodes')
          plt.xlabel('timestamps')
          plt.title('number of suspected nodes with respect to time')
          plt.show()
```



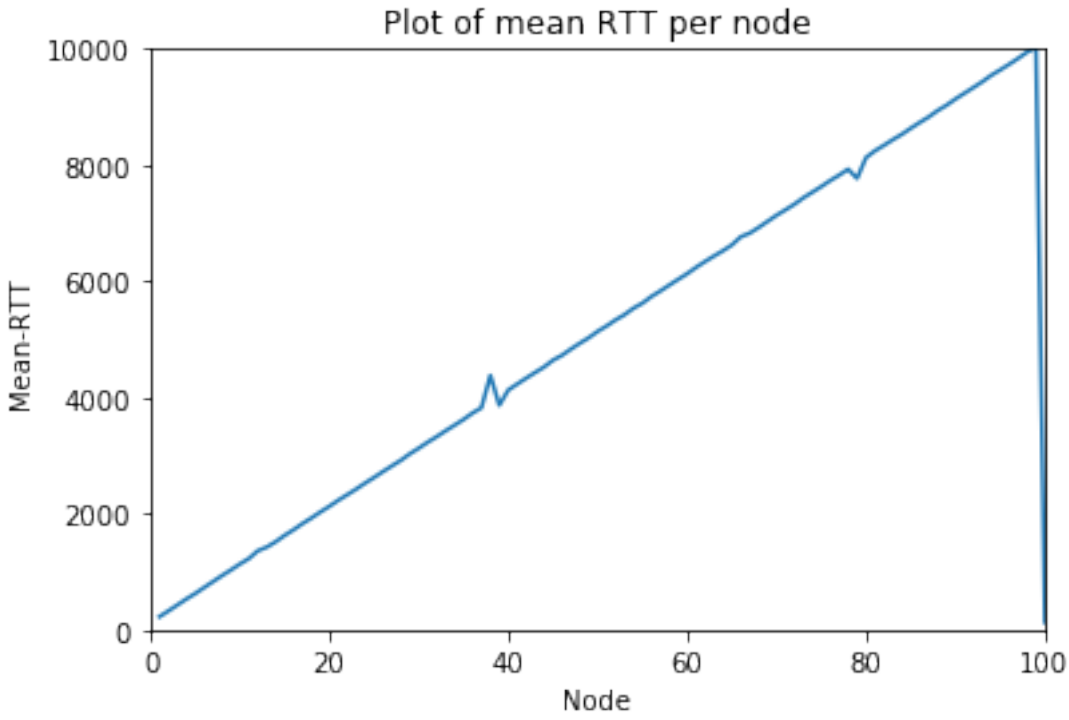

```
In [113]: node_crashes = pd.read_csv('../data/backup/stats_mlfd/node_crashes.csv')
          node_suspicions = pd.read_csv('../data/backup/stats_mlfd/node_suspicions.csv')

In [114]: node_suspicions = pd.merge(node_suspicions, node_crashes, how="inner", on="node")
          node_suspicions = node_suspicions.sort_values('suspected', ascending=False).drop_dupli

In [115]: node_suspicions["detection_time"] = node_suspicions["suspected"] - node_suspicions["ti

In [116]: node_suspicions = node_suspicions[node_suspicions["detection_time"]>0] #Remove prematu

In [117]: node_suspicions
```

Out[117]:

	node	suspected	timestamp	detection_time
1	91	1504425188050	1504425184031	4019
3	54	1504425119710	1504425115691	4019
6	66	1504424999110	1504424995091	4019
8	97	1504425453370	1504425441311	12059
10	73	1504424999110	1504424991072	8038
12	63	1504425401110	1504425393071	8039
14	74	1504425489550	1504425481511	8039
15	12	1504424894591	1504424890574	4017
16	14	1504425316690	1504425312671	4019
17	22	1504425401110	1504425397092	4018
18	20	1504425477490	1504425473471	4019

1.7 Mean RTT per node

```
In [118]: #rtt_data calculate mean per node and merge
          mean_rtt = rtt_data.groupby(['node', 'rtt'], as_index=False).mean().groupby('node')['r

In [120]: matrix = mean_rtt.as_matrix
          mean = np.array(mean_rtt)

In [121]: plt.plot(mean_rtt)
          plt.axis([0, 100, 0, 10000])
          plt.ylabel('Mean-RTT')
          plt.xlabel('Node')
          plt.title('Plot of mean RTT per node')
          plt.show()
```

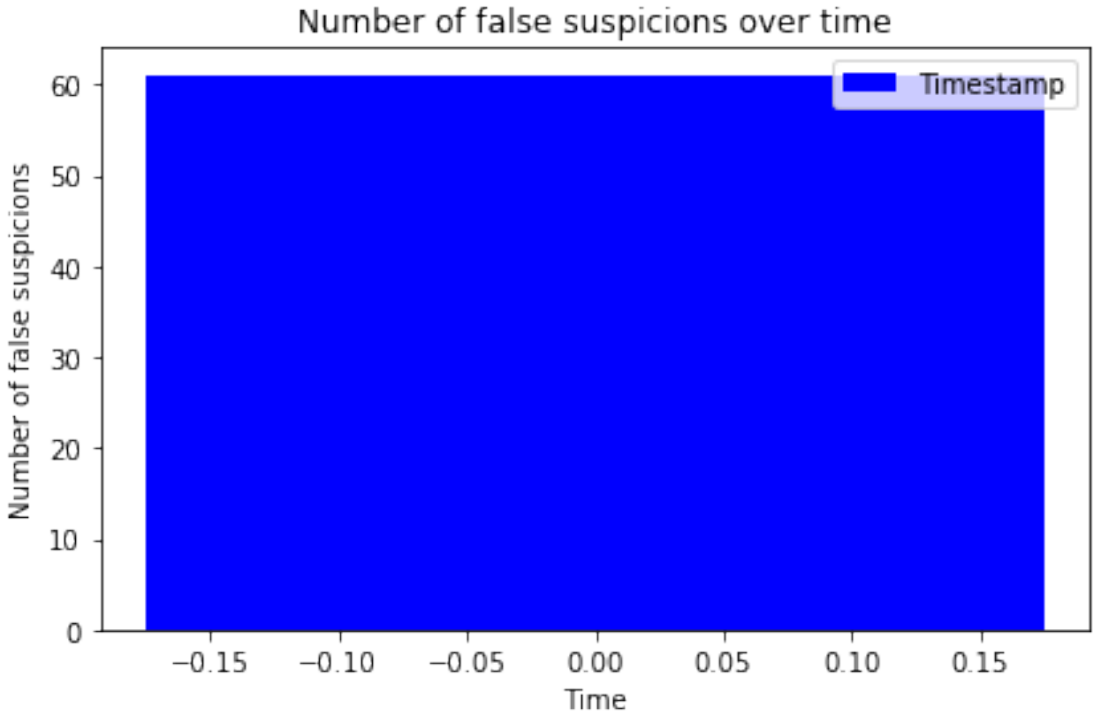


1.8 False suspicions per timeout

```
In [164]: node_suspicions2 = pd.read_csv('../data/backup/stats_mlfd/node_suspicions.csv')
          keys = ['suspected', "node"]
          i1 = node_suspicions2.set_index(keys).index
          i2 = node_suspicions.set_index(keys).index
          false_suspicions = node_suspicions2[~i1.isin(i2)]
          false_suspicions = false_suspicions.groupby("suspected").count()
          false_suspicions
```

```
Out[164]:                 node
          suspected
          1504424866440    61
```

```
In [281]: mlfd_false_suspicions = false_suspicions.values
          l = len(epfd_false_suspicions)
          width = 0.35
          error_config = {'ecolor': '0.3'}
          plt.bar(range(len(mlfd_false_suspicions)), mlfd_false_suspicions, width=width, color='
          plt.xlabel('Time')
          plt.ylabel('Number of false suspicions')
          plt.title('Number of false suspicions over time')
          plt.legend()
          plt.tight_layout()
```

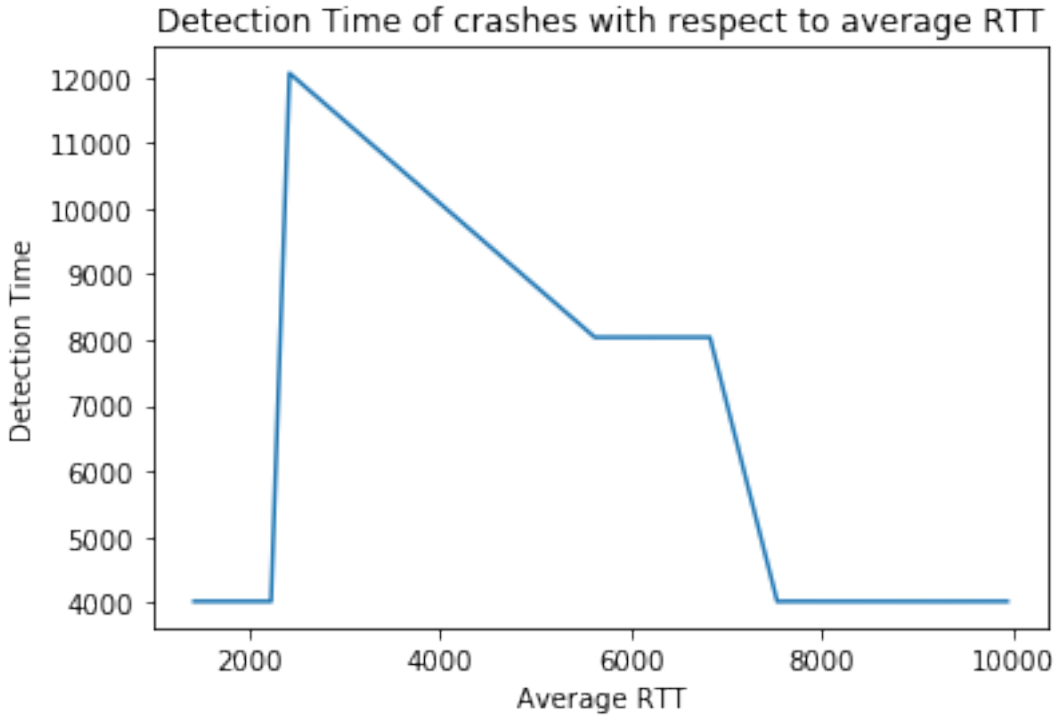


1.9 Time a node was suspected - time node actually crashed, plotted with respect to mean RTT

```
In [122]: mean_n = np.zeros(len(node_suspicions["node"]))
          j = 0
          for i in range(0, len(mean)):
              if(i in node_suspicions["node"].values):
                  #print(i)
```

```
            mean_n[j] = mean[i]
            j = j+1
```

In [123]:
```
plt.plot(mean_n, node_suspicions["detection_time"])
plt.ylabel('Detection Time')
plt.xlabel('Average RTT')
plt.title('Detection Time of crashes with respect to average RTT')
plt.show()
```



1.10 Implementation of an Offline-model to analyze the data, using Keras+Tensorflow

In [126]:
```
from keras.models import Sequential
from keras.layers import Dense
from sklearn.metrics import r2_score

mean_geo_data = rtt_data.drop(["node", "timestamp"], 1)
#mean_geo_data = mean_geo_data[["geoLocation","rtt","mean"]].apply(pd.to_numeric)
df_train, df_test = np.split(mean_geo_data.sample(frac=1), [int(.8*len(mean_geo_data))])
Y_train = df_train["rtt"].values
Y_test = df_test["rtt"].values
X_train = df_train.drop("rtt", 1).values
X_test = df_test.drop("rtt", 1).values
```

```
In [127]: mean_geo_data.head()
```

Out[127]:

	geoLocation	rtt	mean
0	0	270.0	270.0
1	1	338.0	338.0
2	2	548.0	548.0
3	3	599.0	599.0
4	4	648.0	648.0

```
In [128]: # create model
          model = Sequential()
          model.add(Dense(20, input_dim=2, init='uniform', activation='tanh'))
          model.add(Dense(1, init='uniform', activation='linear'))

          # Compile model
          model.compile(loss='mse', optimizer='adam', metrics=['accuracy'])

          # Fit the model
          model.fit(X_train, Y_train, nb_epoch=1000, batch_size=10,  verbose=2)

          # Calculate predictions
          PredTestSet = model.predict(X_train)
          PredValSet = model.predict(X_test)

          # Save predictions
          np.savetxt("trainresults.csv", PredTestSet, delimiter=",")
          np.savetxt("valresults.csv", PredValSet, delimiter=",")
```

```
/home/limmen/anaconda3/lib/python3.6/site-packages/ipykernel_launcher.py:3: UserWarning: Update
  This is separate from the ipykernel package so we can avoid doing imports until
/home/limmen/anaconda3/lib/python3.6/site-packages/ipykernel_launcher.py:4: UserWarning: Update
  after removing the cwd from sys.path.
/home/limmen/anaconda3/lib/python3.6/site-packages/keras/models.py:844: UserWarning: The `nb_epo
  warnings.warn('The `nb_epoch` argument in `fit` '


Epoch 1/1000
0s - loss: 23086801.0035 - acc: 0.0000e+00
Epoch 2/1000
0s - loss: 22948385.7583 - acc: 0.0000e+00
Epoch 3/1000
0s - loss: 22810687.8092 - acc: 1.1703e-04
Epoch 4/1000
0s - loss: 22673897.5723 - acc: 0.0000e+00
Epoch 5/1000
0s - loss: 22537339.0164 - acc: 1.1703e-04
Epoch 6/1000
0s - loss: 22401447.3245 - acc: 0.0000e+00
Epoch 7/1000
```

```
0s - loss: 22266624.9005 - acc: 1.1703e-04
Epoch 8/1000
0s - loss: 22132150.7109 - acc: 1.1703e-04
Epoch 9/1000
0s - loss: 21998333.2203 - acc: 1.1703e-04
Epoch 10/1000
0s - loss: 21865394.1104 - acc: 1.1703e-04
Epoch 11/1000
0s - loss: 21733002.2926 - acc: 2.3406e-04
Epoch 12/1000
0s - loss: 21601279.3347 - acc: 1.1703e-04
Epoch 13/1000
0s - loss: 21470001.3520 - acc: 1.1703e-04
Epoch 14/1000
0s - loss: 21339395.9067 - acc: 0.0000e+00
Epoch 15/1000
0s - loss: 21209498.5660 - acc: 1.1703e-04
Epoch 16/1000
0s - loss: 21080234.1170 - acc: 0.0000e+00
Epoch 17/1000
0s - loss: 20951599.2917 - acc: 2.3406e-04
Epoch 18/1000
0s - loss: 20823522.4225 - acc: 2.3406e-04
Epoch 19/1000
0s - loss: 20695938.7077 - acc: 2.3406e-04
Epoch 20/1000
0s - loss: 20569155.8660 - acc: 1.1703e-04
Epoch 21/1000
0s - loss: 20442874.3362 - acc: 3.5108e-04
Epoch 22/1000
0s - loss: 20317315.5208 - acc: 0.0000e+00
Epoch 23/1000
0s - loss: 20192327.6635 - acc: 4.6811e-04
Epoch 24/1000
0s - loss: 20068101.5667 - acc: 2.3406e-04
Epoch 25/1000
0s - loss: 19944151.4277 - acc: 4.6811e-04
Epoch 26/1000
0s - loss: 19820987.5815 - acc: 2.3406e-04
Epoch 27/1000
0s - loss: 19698507.2405 - acc: 2.3406e-04
Epoch 28/1000
0s - loss: 19576494.8868 - acc: 7.0217e-04
Epoch 29/1000
0s - loss: 19454682.0149 - acc: 4.6811e-04
Epoch 30/1000
0s - loss: 19333561.0164 - acc: 2.3406e-04
Epoch 31/1000
```

```
0s - loss: 19213348.9523 - acc: 1.1703e-04
Epoch 32/1000
0s - loss: 19093477.1084 - acc: 4.6811e-04
Epoch 33/1000
0s - loss: 18974355.9339 - acc: 5.8514e-04
Epoch 34/1000
0s - loss: 18856183.1469 - acc: 4.6811e-04
Epoch 35/1000
0s - loss: 18738185.6982 - acc: 5.8514e-04
Epoch 36/1000
0s - loss: 18620686.3695 - acc: 2.3406e-04
Epoch 37/1000
0s - loss: 18503882.2466 - acc: 7.0217e-04
Epoch 38/1000
0s - loss: 18387731.2030 - acc: 0.0000e+00
Epoch 39/1000
0s - loss: 18271947.8709 - acc: 5.8514e-04
Epoch 40/1000
0s - loss: 18156896.7121 - acc: 3.5108e-04
Epoch 41/1000
0s - loss: 18042066.4210 - acc: 2.3406e-04
Epoch 42/1000
0s - loss: 17928404.5546 - acc: 4.6811e-04
Epoch 43/1000
0s - loss: 17815174.1852 - acc: 5.8514e-04
Epoch 44/1000
0s - loss: 17702406.9754 - acc: 8.1919e-04
Epoch 45/1000
0s - loss: 17590146.7248 - acc: 3.5108e-04
Epoch 46/1000
0s - loss: 17478487.9020 - acc: 7.0217e-04
Epoch 47/1000
0s - loss: 17367607.1605 - acc: 4.6811e-04
Epoch 48/1000
0s - loss: 17257020.9334 - acc: 3.5108e-04
Epoch 49/1000
0s - loss: 17147548.4807 - acc: 3.5108e-04
Epoch 50/1000
0s - loss: 17037343.8811 - acc: 7.0217e-04
Epoch 51/1000
0s - loss: 16928325.4838 - acc: 7.0217e-04
Epoch 52/1000
0s - loss: 16820091.6526 - acc: 7.0217e-04
Epoch 53/1000
0s - loss: 16712256.3999 - acc: 7.0217e-04
Epoch 54/1000
0s - loss: 16604972.1170 - acc: 1.1703e-04
Epoch 55/1000
```

```
0s - loss: 16498260.0714 - acc: 7.0217e-04
Epoch 56/1000
0s - loss: 16391759.1289 - acc: 0.0016
Epoch 57/1000
0s - loss: 16286209.3628 - acc: 2.3406e-04
Epoch 58/1000
0s - loss: 16181349.6544 - acc: 0.0000e+00
Epoch 59/1000
0s - loss: 16076628.4743 - acc: 2.3406e-04
Epoch 60/1000
0s - loss: 15972500.8344 - acc: 1.1703e-04
Epoch 61/1000
0s - loss: 15868694.5171 - acc: 0.0011
Epoch 62/1000
0s - loss: 15765256.8315 - acc: 9.3622e-04
Epoch 63/1000
0s - loss: 15663111.2324 - acc: 5.8514e-04
Epoch 64/1000
0s - loss: 15561045.4125 - acc: 7.0217e-04
Epoch 65/1000
0s - loss: 15459555.9499 - acc: 7.0217e-04
Epoch 66/1000
0s - loss: 15359103.8331 - acc: 7.0217e-04
Epoch 67/1000
0s - loss: 15258893.2876 - acc: 9.3622e-04
Epoch 68/1000
0s - loss: 15159291.6297 - acc: 0.0012
Epoch 69/1000
0s - loss: 15059856.9533 - acc: 3.5108e-04
Epoch 70/1000
0s - loss: 14961154.5980 - acc: 3.5108e-04
Epoch 71/1000
0s - loss: 14864715.7919 - acc: 5.8514e-04
Epoch 72/1000
0s - loss: 14765881.5763 - acc: 0.0011
Epoch 73/1000
0s - loss: 14667644.7675 - acc: 7.0217e-04
Epoch 74/1000
0s - loss: 14570943.0249 - acc: 8.1919e-04
Epoch 75/1000
0s - loss: 14474894.1025 - acc: 3.5108e-04
Epoch 76/1000
0s - loss: 14379593.4811 - acc: 0.0011
Epoch 77/1000
0s - loss: 14283995.5471 - acc: 8.1919e-04
Epoch 78/1000
0s - loss: 14189015.9377 - acc: 8.1919e-04
Epoch 79/1000
```

```
0s - loss: 14095659.9360 - acc: 3.5108e-04
Epoch 80/1000
0s - loss: 14001701.5638 - acc: 9.3622e-04
Epoch 81/1000
0s - loss: 13908833.8215 - acc: 8.1919e-04
Epoch 82/1000
0s - loss: 13816436.2578 - acc: 9.3622e-04
Epoch 83/1000
0s - loss: 13724553.9501 - acc: 4.6811e-04
Epoch 84/1000
0s - loss: 13631825.6441 - acc: 0.0011
Epoch 85/1000
0s - loss: 13541112.9517 - acc: 9.3622e-04
Epoch 86/1000
0s - loss: 13450946.2746 - acc: 9.3622e-04
Epoch 87/1000
0s - loss: 13359941.8568 - acc: 7.0217e-04
Epoch 88/1000
0s - loss: 13270599.6383 - acc: 9.3622e-04
Epoch 89/1000
0s - loss: 13180958.6768 - acc: 8.1919e-04
Epoch 90/1000
0s - loss: 13093171.7798 - acc: 5.8514e-04
Epoch 91/1000
0s - loss: 13003881.5541 - acc: 8.1919e-04
Epoch 92/1000
0s - loss: 12918131.5771 - acc: 0.0011
Epoch 93/1000
0s - loss: 12829459.3618 - acc: 8.1919e-04
Epoch 94/1000
0s - loss: 12742719.6913 - acc: 0.0015
Epoch 95/1000
0s - loss: 12656768.4988 - acc: 7.0217e-04
Epoch 96/1000
0s - loss: 12570288.9544 - acc: 0.0013
Epoch 97/1000
0s - loss: 12484896.2108 - acc: 0.0011
Epoch 98/1000
0s - loss: 12400547.7385 - acc: 7.0217e-04
Epoch 99/1000
0s - loss: 12316833.9252 - acc: 7.0217e-04
Epoch 100/1000
0s - loss: 12233037.0750 - acc: 4.6811e-04
Epoch 101/1000
0s - loss: 12148558.5186 - acc: 9.3622e-04
Epoch 102/1000
0s - loss: 12065839.5081 - acc: 0.0016
Epoch 103/1000
```

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0s - loss: 11983248.5895 - acc: 7.0217e-04
Epoch 104/1000
0s - loss: 11901192.9191 - acc: 0.0011
Epoch 105/1000
0s - loss: 11820041.3183 - acc: 9.3622e-04
Epoch 106/1000
0s - loss: 11739002.8433 - acc: 8.1919e-04
Epoch 107/1000
0s - loss: 11658466.2076 - acc: 8.1919e-04
Epoch 108/1000
0s - loss: 11577289.4483 - acc: 5.8514e-04
Epoch 109/1000
0s - loss: 11498101.5196 - acc: 9.3622e-04
Epoch 110/1000
0s - loss: 11419023.4759 - acc: 0.0011
Epoch 111/1000
0s - loss: 11340016.6318 - acc: 0.0012
Epoch 112/1000
0s - loss: 11262848.4603 - acc: 5.8514e-04
Epoch 113/1000
0s - loss: 11184491.1394 - acc: 0.0013
Epoch 114/1000
0s - loss: 11105964.4828 - acc: 0.0012
Epoch 115/1000
0s - loss: 11029398.1730 - acc: 5.8514e-04
Epoch 116/1000
0s - loss: 10952567.2540 - acc: 0.0020
Epoch 117/1000
0s - loss: 10877122.6849 - acc: 0.0019
Epoch 118/1000
0s - loss: 10800784.7331 - acc: 9.3622e-04
Epoch 119/1000
0s - loss: 10726836.1431 - acc: 8.1919e-04
Epoch 120/1000
0s - loss: 10651078.6771 - acc: 0.0013
Epoch 121/1000
0s - loss: 10576418.4935 - acc: 0.0013
Epoch 122/1000
0s - loss: 10503500.1206 - acc: 8.1919e-04
Epoch 123/1000
0s - loss: 10429886.8032 - acc: 5.8514e-04
Epoch 124/1000
0s - loss: 10356583.4082 - acc: 9.3622e-04
Epoch 125/1000
0s - loss: 10283346.1126 - acc: 0.0011
Epoch 126/1000
0s - loss: 10210876.4650 - acc: 0.0018
Epoch 127/1000
```

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0s - loss: 10138568.4690 - acc: 0.0018
Epoch 128/1000
0s - loss: 10068384.3860 - acc: 0.0013
Epoch 129/1000
0s - loss: 9999000.8472 - acc: 0.0012
Epoch 130/1000
0s - loss: 9926127.0520 - acc: 0.0011
Epoch 131/1000
0s - loss: 9855543.8189 - acc: 0.0020
Epoch 132/1000
0s - loss: 9786551.4469 - acc: 0.0018
Epoch 133/1000
0s - loss: 9716479.3098 - acc: 0.0018
Epoch 134/1000
0s - loss: 9646649.6362 - acc: 9.3622e-04
Epoch 135/1000
0s - loss: 9762378.4099 - acc: 8.1919e-04
Epoch 136/1000
0s - loss: 10432741.6618 - acc: 0.0015
Epoch 137/1000
0s - loss: 10357892.8559 - acc: 0.0013
Epoch 138/1000
0s - loss: 10284640.1453 - acc: 0.0018
Epoch 139/1000
0s - loss: 10214772.8880 - acc: 0.0014
Epoch 140/1000
0s - loss: 10140377.3783 - acc: 8.1919e-04
Epoch 141/1000
0s - loss: 10070293.6691 - acc: 7.0217e-04
Epoch 142/1000
0s - loss: 9998693.6609 - acc: 0.0016
Epoch 143/1000
0s - loss: 9926723.3803 - acc: 0.0018
Epoch 144/1000
0s - loss: 9857301.4667 - acc: 0.0012
Epoch 145/1000
0s - loss: 9788561.8377 - acc: 0.0013
Epoch 146/1000
0s - loss: 9718544.6793 - acc: 5.8514e-04
Epoch 147/1000
0s - loss: 9651618.0388 - acc: 0.0012
Epoch 148/1000
0s - loss: 9581753.3319 - acc: 0.0019
Epoch 149/1000
0s - loss: 9512893.7334 - acc: 0.0016
Epoch 150/1000
0s - loss: 9446528.5622 - acc: 0.0012
Epoch 151/1000
```

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0s - loss: 9378415.7847 - acc: 0.0011
Epoch 152/1000
0s - loss: 9312272.0611 - acc: 0.0014
Epoch 153/1000
0s - loss: 9246248.5547 - acc: 0.0012
Epoch 154/1000
0s - loss: 9179409.4296 - acc: 0.0018
Epoch 155/1000
0s - loss: 9116334.9700 - acc: 0.0012
Epoch 156/1000
0s - loss: 9049373.7127 - acc: 0.0018
Epoch 157/1000
0s - loss: 8982412.7264 - acc: 0.0012
Epoch 158/1000
0s - loss: 8918981.2181 - acc: 0.0014
Epoch 159/1000
0s - loss: 8854578.6175 - acc: 0.0012
Epoch 160/1000
0s - loss: 8790065.9315 - acc: 0.0012
Epoch 161/1000
0s - loss: 8728227.5169 - acc: 4.6811e-04
Epoch 162/1000
0s - loss: 8662796.3356 - acc: 0.0011
Epoch 163/1000
0s - loss: 8602152.6018 - acc: 9.3622e-04
Epoch 164/1000
0s - loss: 8539042.9380 - acc: 9.3622e-04
Epoch 165/1000
0s - loss: 8476556.1621 - acc: 0.0018
Epoch 166/1000
0s - loss: 8416064.3924 - acc: 5.8514e-04
Epoch 167/1000
0s - loss: 8352863.2014 - acc: 7.0217e-04
Epoch 168/1000
0s - loss: 8292785.8391 - acc: 0.0011
Epoch 169/1000
0s - loss: 8234267.8247 - acc: 0.0013
Epoch 170/1000
0s - loss: 8174206.0668 - acc: 0.0016
Epoch 171/1000
0s - loss: 8115141.0538 - acc: 0.0011
Epoch 172/1000
0s - loss: 8055091.5423 - acc: 0.0014
Epoch 173/1000
0s - loss: 7994606.5259 - acc: 0.0022
Epoch 174/1000
0s - loss: 7937228.2844 - acc: 9.3622e-04
Epoch 175/1000
```

```
0s - loss: 7877650.3812 - acc: 0.0015
Epoch 176/1000
0s - loss: 7822640.3548 - acc: 8.1919e-04
Epoch 177/1000
0s - loss: 7763018.0500 - acc: 0.0020
Epoch 178/1000
0s - loss: 8525842.7495 - acc: 0.0014
Epoch 179/1000
0s - loss: 8676990.6547 - acc: 0.0014
Epoch 180/1000
0s - loss: 8616856.0252 - acc: 0.0015
Epoch 181/1000
0s - loss: 8552830.8170 - acc: 0.0015
Epoch 182/1000
0s - loss: 8491762.5689 - acc: 0.0015
Epoch 183/1000
0s - loss: 8428092.2603 - acc: 0.0015
Epoch 184/1000
0s - loss: 8367233.3512 - acc: 0.0015
Epoch 185/1000
0s - loss: 8306135.1314 - acc: 0.0025
Epoch 186/1000
0s - loss: 8245096.8584 - acc: 9.3622e-04
Epoch 187/1000
0s - loss: 8186666.1412 - acc: 0.0015
Epoch 188/1000
0s - loss: 8126060.4721 - acc: 0.0014
Epoch 189/1000
0s - loss: 8066932.0710 - acc: 0.0023
Epoch 190/1000
0s - loss: 8007866.5359 - acc: 0.0025
Epoch 191/1000
0s - loss: 7951943.1055 - acc: 0.0013
Epoch 192/1000
0s - loss: 7890802.6251 - acc: 0.0018
Epoch 193/1000
0s - loss: 7834397.8746 - acc: 0.0020
Epoch 194/1000
0s - loss: 7777541.2683 - acc: 0.0013
Epoch 195/1000
0s - loss: 7717437.5707 - acc: 0.0016
Epoch 196/1000
0s - loss: 7667626.3661 - acc: 9.3622e-04
Epoch 197/1000
0s - loss: 7604228.2502 - acc: 0.0011
Epoch 198/1000
0s - loss: 7552909.2959 - acc: 0.0018
Epoch 199/1000
```

```
0s - loss: 7492027.9312 - acc: 0.0018
Epoch 200/1000
0s - loss: 7441946.2814 - acc: 0.0014
Epoch 201/1000
0s - loss: 7383788.9397 - acc: 0.0012
Epoch 202/1000
0s - loss: 7334704.6617 - acc: 0.0012
Epoch 203/1000
0s - loss: 7276480.0391 - acc: 9.3622e-04
Epoch 204/1000
0s - loss: 7223549.4406 - acc: 0.0012
Epoch 205/1000
0s - loss: 7168760.8467 - acc: 0.0013
Epoch 206/1000
0s - loss: 7123431.6819 - acc: 0.0019
Epoch 207/1000
0s - loss: 7060296.0248 - acc: 0.0022
Epoch 208/1000
0s - loss: 7013909.0374 - acc: 0.0019
Epoch 209/1000
0s - loss: 6958935.6671 - acc: 0.0015
Epoch 210/1000
0s - loss: 6911141.4301 - acc: 0.0011
Epoch 211/1000
0s - loss: 6852593.1117 - acc: 0.0016
Epoch 212/1000
0s - loss: 6802285.9784 - acc: 0.0026
Epoch 213/1000
0s - loss: 6754519.8377 - acc: 0.0012
Epoch 214/1000
0s - loss: 6701694.4891 - acc: 0.0016
Epoch 215/1000
0s - loss: 6650603.1613 - acc: 0.0018
Epoch 216/1000
0s - loss: 6618261.3001 - acc: 0.0011
Epoch 217/1000
0s - loss: 6554379.5338 - acc: 1.1703e-04
Epoch 218/1000
0s - loss: 6501967.0352 - acc: 0.0022
Epoch 219/1000
0s - loss: 6453084.4793 - acc: 4.6811e-04
Epoch 220/1000
0s - loss: 6417602.6079 - acc: 9.3622e-04
Epoch 221/1000
0s - loss: 6357492.0677 - acc: 0.0016
Epoch 222/1000
0s - loss: 6308422.3985 - acc: 0.0012
Epoch 223/1000
```

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0s - loss: 6262257.7674 - acc: 0.0022
Epoch 224/1000
0s - loss: 6213812.0041 - acc: 0.0013
Epoch 225/1000
0s - loss: 6166724.8443 - acc: 0.0014
Epoch 226/1000
0s - loss: 6123627.8521 - acc: 0.0016
Epoch 227/1000
0s - loss: 6083554.3766 - acc: 9.3622e-04
Epoch 228/1000
0s - loss: 6032566.7309 - acc: 0.0012
Epoch 229/1000
0s - loss: 5989410.1364 - acc: 0.0013
Epoch 230/1000
0s - loss: 5935715.5582 - acc: 0.0016
Epoch 231/1000
0s - loss: 5900826.0667 - acc: 0.0021
Epoch 232/1000
0s - loss: 5858497.0172 - acc: 0.0018
Epoch 233/1000
0s - loss: 5798615.9582 - acc: 0.0018
Epoch 234/1000
0s - loss: 5766570.6456 - acc: 0.0014
Epoch 235/1000
0s - loss: 5723339.3594 - acc: 0.0013
Epoch 236/1000
0s - loss: 5671070.5762 - acc: 0.0015
Epoch 237/1000
0s - loss: 5628855.0334 - acc: 0.0012
Epoch 238/1000
0s - loss: 5580410.4049 - acc: 9.3622e-04
Epoch 239/1000
0s - loss: 5542603.4219 - acc: 0.0018
Epoch 240/1000
0s - loss: 5505242.7182 - acc: 0.0014
Epoch 241/1000
0s - loss: 5460136.9745 - acc: 7.0217e-04
Epoch 242/1000
0s - loss: 5419051.0829 - acc: 5.8514e-04
Epoch 243/1000
0s - loss: 5378823.4062 - acc: 7.0217e-04
Epoch 244/1000
0s - loss: 5338796.2062 - acc: 0.0016
Epoch 245/1000
0s - loss: 5289556.7436 - acc: 9.3622e-04
Epoch 246/1000
0s - loss: 5257794.8025 - acc: 0.0012
Epoch 247/1000
```

```
0s - loss: 5281357.6212 - acc: 0.0020
Epoch 248/1000
0s - loss: 6235346.7497 - acc: 7.0217e-04
Epoch 249/1000
0s - loss: 6189870.4655 - acc: 0.0013
Epoch 250/1000
0s - loss: 6148076.4662 - acc: 0.0013
Epoch 251/1000
0s - loss: 6103348.5296 - acc: 0.0013
Epoch 252/1000
0s - loss: 6051631.0343 - acc: 8.1919e-04
Epoch 253/1000
0s - loss: 6005698.8086 - acc: 0.0018
Epoch 254/1000
0s - loss: 5954459.8732 - acc: 0.0014
Epoch 255/1000
0s - loss: 5909797.5118 - acc: 0.0018
Epoch 256/1000
0s - loss: 5866496.9940 - acc: 0.0011
Epoch 257/1000
0s - loss: 5831087.2043 - acc: 9.3622e-04
Epoch 258/1000
0s - loss: 5783505.1020 - acc: 0.0018
Epoch 259/1000
0s - loss: 5735676.6111 - acc: 0.0012
Epoch 260/1000
0s - loss: 5689250.5178 - acc: 0.0014
Epoch 261/1000
0s - loss: 5671378.7645 - acc: 9.3622e-04
Epoch 262/1000
0s - loss: 5602831.7530 - acc: 0.0014
Epoch 263/1000
0s - loss: 5561102.1590 - acc: 5.8514e-04
Epoch 264/1000
0s - loss: 5526294.9453 - acc: 0.0019
Epoch 265/1000
0s - loss: 5478562.4531 - acc: 0.0014
Epoch 266/1000
0s - loss: 5437254.0001 - acc: 0.0013
Epoch 267/1000
0s - loss: 5395049.9976 - acc: 0.0015
Epoch 268/1000
0s - loss: 5357890.7113 - acc: 8.1919e-04
Epoch 269/1000
0s - loss: 5311113.5631 - acc: 0.0014
Epoch 270/1000
0s - loss: 6012199.4559 - acc: 0.0019
Epoch 271/1000
```

```
0s - loss: 6406804.7198 - acc: 0.0025
Epoch 272/1000
0s - loss: 6356585.8105 - acc: 0.0021
Epoch 273/1000
0s - loss: 6320226.3266 - acc: 0.0011
Epoch 274/1000
0s - loss: 6268017.2912 - acc: 0.0012
Epoch 275/1000
0s - loss: 6233196.9926 - acc: 0.0014
Epoch 276/1000
0s - loss: 6167899.3237 - acc: 8.1919e-04
Epoch 277/1000
0s - loss: 6124873.9245 - acc: 0.0012
Epoch 278/1000
0s - loss: 6080883.1254 - acc: 0.0019
Epoch 279/1000
0s - loss: 6033124.9383 - acc: 7.0217e-04
Epoch 280/1000
0s - loss: 5989810.2146 - acc: 0.0016
Epoch 281/1000
0s - loss: 5962185.2042 - acc: 0.0011
Epoch 282/1000
0s - loss: 5892962.3271 - acc: 0.0019
Epoch 283/1000
0s - loss: 5853369.6756 - acc: 7.0217e-04
Epoch 284/1000
0s - loss: 5806583.1397 - acc: 0.0011
Epoch 285/1000
0s - loss: 5772233.7705 - acc: 0.0011
Epoch 286/1000
0s - loss: 5727277.1194 - acc: 0.0018
Epoch 287/1000
0s - loss: 5679923.6621 - acc: 0.0012
Epoch 288/1000
0s - loss: 5635976.8368 - acc: 0.0011
Epoch 289/1000
0s - loss: 5597563.3541 - acc: 0.0015
Epoch 290/1000
0s - loss: 5552286.8242 - acc: 0.0015
Epoch 291/1000
0s - loss: 5516398.9958 - acc: 0.0012
Epoch 292/1000
0s - loss: 5467358.9739 - acc: 0.0011
Epoch 293/1000
0s - loss: 5432643.2192 - acc: 0.0014
Epoch 294/1000
0s - loss: 5382539.3152 - acc: 0.0011
Epoch 295/1000
```

```
0s - loss: 5340077.6037 - acc: 7.0217e-04
Epoch 296/1000
0s - loss: 5307439.2934 - acc: 0.0013
Epoch 297/1000
0s - loss: 5270902.2458 - acc: 7.0217e-04
Epoch 298/1000
0s - loss: 5218596.3980 - acc: 0.0015
Epoch 299/1000
0s - loss: 5183202.8783 - acc: 0.0013
Epoch 300/1000
0s - loss: 5147788.9582 - acc: 0.0013
Epoch 301/1000
0s - loss: 5105541.6419 - acc: 9.3622e-04
Epoch 302/1000
0s - loss: 5066496.2063 - acc: 0.0015
Epoch 303/1000
0s - loss: 5025094.9212 - acc: 0.0014
Epoch 304/1000
0s - loss: 5219357.4929 - acc: 0.0012
Epoch 305/1000
0s - loss: 6235611.9690 - acc: 7.0217e-04
Epoch 306/1000
0s - loss: 6187801.7257 - acc: 5.8514e-04
Epoch 307/1000
0s - loss: 6141242.8544 - acc: 0.0011
Epoch 308/1000
0s - loss: 6099377.0106 - acc: 7.0217e-04
Epoch 309/1000
0s - loss: 6052291.4738 - acc: 0.0011
Epoch 310/1000
0s - loss: 6002033.7888 - acc: 7.0217e-04
Epoch 311/1000
0s - loss: 5975790.3046 - acc: 7.0217e-04
Epoch 312/1000
0s - loss: 5913966.6236 - acc: 0.0012
Epoch 313/1000
0s - loss: 5885628.4882 - acc: 8.1919e-04
Epoch 314/1000
0s - loss: 5836807.9212 - acc: 0.0012
Epoch 315/1000
0s - loss: 5783378.2895 - acc: 9.3622e-04
Epoch 316/1000
0s - loss: 5741729.2582 - acc: 0.0012
Epoch 317/1000
0s - loss: 5708169.7410 - acc: 0.0019
Epoch 318/1000
0s - loss: 5658935.2795 - acc: 9.3622e-04
Epoch 319/1000
```

```
0s - loss: 5618077.3873 - acc: 0.0014
Epoch 320/1000
0s - loss: 5579707.9023 - acc: 0.0014
Epoch 321/1000
0s - loss: 5529774.7101 - acc: 0.0014
Epoch 322/1000
0s - loss: 5503159.2310 - acc: 5.8514e-04
Epoch 323/1000
0s - loss: 5449032.4697 - acc: 9.3622e-04
Epoch 324/1000
0s - loss: 5406381.5105 - acc: 0.0013
Epoch 325/1000
0s - loss: 5387895.3039 - acc: 5.8514e-04
Epoch 326/1000
0s - loss: 5328262.0043 - acc: 0.0015
Epoch 327/1000
0s - loss: 6319134.6278 - acc: 9.3622e-04
Epoch 328/1000
0s - loss: 6697202.9334 - acc: 0.0016
Epoch 329/1000
0s - loss: 6648505.3995 - acc: 9.3622e-04
Epoch 330/1000
0s - loss: 6606566.2971 - acc: 9.3622e-04
Epoch 331/1000
0s - loss: 6558476.3012 - acc: 0.0011
Epoch 332/1000
0s - loss: 6505151.5062 - acc: 4.6811e-04
Epoch 333/1000
0s - loss: 6460328.7432 - acc: 5.8514e-04
Epoch 334/1000
0s - loss: 6411278.6925 - acc: 0.0011
Epoch 335/1000
0s - loss: 6371236.1058 - acc: 7.0217e-04
Epoch 336/1000
0s - loss: 6326755.9042 - acc: 8.1919e-04
Epoch 337/1000
0s - loss: 6275684.3778 - acc: 0.0011
Epoch 338/1000
0s - loss: 6234139.5038 - acc: 0.0014
Epoch 339/1000
0s - loss: 6186329.5566 - acc: 0.0014
Epoch 340/1000
0s - loss: 6144357.0403 - acc: 0.0011
Epoch 341/1000
0s - loss: 6097424.6840 - acc: 0.0011
Epoch 342/1000
0s - loss: 6059896.8804 - acc: 4.6811e-04
Epoch 343/1000
```

```
0s - loss: 6008712.1620 - acc: 8.1919e-04
Epoch 344/1000
0s - loss: 6014375.7901 - acc: 7.0217e-04
Epoch 345/1000
0s - loss: 5920800.6116 - acc: 7.0217e-04
Epoch 346/1000
0s - loss: 5892926.0722 - acc: 8.1919e-04
Epoch 347/1000
0s - loss: 5842564.9231 - acc: 4.6811e-04
Epoch 348/1000
0s - loss: 5805230.2909 - acc: 0.0015
Epoch 349/1000
0s - loss: 5762021.8784 - acc: 0.0011
Epoch 350/1000
0s - loss: 5739284.6048 - acc: 0.0011
Epoch 351/1000
0s - loss: 5675926.6625 - acc: 0.0012
Epoch 352/1000
0s - loss: 5637940.8529 - acc: 5.8514e-04
Epoch 353/1000
0s - loss: 5615138.1509 - acc: 0.0011
Epoch 354/1000
0s - loss: 6623798.3038 - acc: 9.3622e-04
Epoch 355/1000
0s - loss: 7150184.6183 - acc: 0.0012
Epoch 356/1000
0s - loss: 7100970.3635 - acc: 5.8514e-04
Epoch 357/1000
0s - loss: 7047945.7745 - acc: 0.0012
Epoch 358/1000
0s - loss: 7002264.7295 - acc: 5.8514e-04
Epoch 359/1000
0s - loss: 6958111.0103 - acc: 4.6811e-04
Epoch 360/1000
0s - loss: 6907044.2229 - acc: 3.5108e-04
Epoch 361/1000
0s - loss: 6857830.0060 - acc: 9.3622e-04
Epoch 362/1000
0s - loss: 6814208.1732 - acc: 7.0217e-04
Epoch 363/1000
0s - loss: 6764529.4452 - acc: 4.6811e-04
Epoch 364/1000
0s - loss: 6727607.6874 - acc: 4.6811e-04
Epoch 365/1000
0s - loss: 6682820.6420 - acc: 3.5108e-04
Epoch 366/1000
0s - loss: 6627552.7647 - acc: 0.0013
Epoch 367/1000
```

```
0s - loss: 6582105.9198 - acc: 0.0011
Epoch 368/1000
0s - loss: 6557446.9886 - acc: 3.5108e-04
Epoch 369/1000
0s - loss: 6498518.8618 - acc: 3.5108e-04
Epoch 370/1000
0s - loss: 6451318.0620 - acc: 9.3622e-04
Epoch 371/1000
0s - loss: 6410987.3756 - acc: 7.0217e-04
Epoch 372/1000
0s - loss: 6374050.1762 - acc: 4.6811e-04
Epoch 373/1000
0s - loss: 6322402.1112 - acc: 0.0013
Epoch 374/1000
0s - loss: 6280547.6052 - acc: 7.0217e-04
Epoch 375/1000
0s - loss: 6244243.9509 - acc: 2.3406e-04
Epoch 376/1000
0s - loss: 7587551.7092 - acc: 2.3406e-04
Epoch 377/1000
0s - loss: 8041125.9837 - acc: 7.0217e-04
Epoch 378/1000
0s - loss: 7991799.5729 - acc: 3.5108e-04
Epoch 379/1000
0s - loss: 7932764.8815 - acc: 7.0217e-04
Epoch 380/1000
0s - loss: 7886271.7555 - acc: 1.1703e-04
Epoch 381/1000
0s - loss: 7831026.6388 - acc: 5.8514e-04
Epoch 382/1000
0s - loss: 7779981.8446 - acc: 3.5108e-04
Epoch 383/1000
0s - loss: 7732055.1418 - acc: 8.1919e-04
Epoch 384/1000
0s - loss: 7681688.5805 - acc: 7.0217e-04
Epoch 385/1000
0s - loss: 7631697.6856 - acc: 4.6811e-04
Epoch 386/1000
0s - loss: 7583892.3777 - acc: 0.0011
Epoch 387/1000
0s - loss: 7535638.0056 - acc: 3.5108e-04
Epoch 388/1000
0s - loss: 7490948.0022 - acc: 7.0217e-04
Epoch 389/1000
0s - loss: 7441659.5348 - acc: 4.6811e-04
Epoch 390/1000
0s - loss: 7397017.7169 - acc: 5.8514e-04
Epoch 391/1000
```

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0s - loss: 7348379.9715 - acc: 1.1703e-04
Epoch 392/1000
0s - loss: 7304478.7367 - acc: 5.8514e-04
Epoch 393/1000
0s - loss: 7254298.5384 - acc: 5.8514e-04
Epoch 394/1000
0s - loss: 7215169.9422 - acc: 8.1919e-04
Epoch 395/1000
0s - loss: 7169917.9297 - acc: 7.0217e-04
Epoch 396/1000
0s - loss: 7125569.4700 - acc: 7.0217e-04
Epoch 397/1000
0s - loss: 7078299.8760 - acc: 9.3622e-04
Epoch 398/1000
0s - loss: 7036484.4627 - acc: 7.0217e-04
Epoch 399/1000
0s - loss: 7000513.8387 - acc: 7.0217e-04
Epoch 400/1000
0s - loss: 6954222.5388 - acc: 8.1919e-04
Epoch 401/1000
0s - loss: 6908027.7896 - acc: 4.6811e-04
Epoch 402/1000
0s - loss: 6887386.8363 - acc: 5.8514e-04
Epoch 403/1000
0s - loss: 6823919.4604 - acc: 5.8514e-04
Epoch 404/1000
0s - loss: 6787169.9589 - acc: 4.6811e-04
Epoch 405/1000
0s - loss: 6744663.1812 - acc: 0.0012
Epoch 406/1000
0s - loss: 6704038.0198 - acc: 4.6811e-04
Epoch 407/1000
0s - loss: 6666258.4738 - acc: 5.8514e-04
Epoch 408/1000
0s - loss: 6638567.9530 - acc: 4.6811e-04
Epoch 409/1000
0s - loss: 6588280.4791 - acc: 5.8514e-04
Epoch 410/1000
0s - loss: 6553315.4899 - acc: 7.0217e-04
Epoch 411/1000
0s - loss: 6533486.5304 - acc: 2.3406e-04
Epoch 412/1000
0s - loss: 6491025.1969 - acc: 2.3406e-04
Epoch 413/1000
0s - loss: 6432482.9695 - acc: 3.5108e-04
Epoch 414/1000
0s - loss: 6405479.8588 - acc: 2.3406e-04
Epoch 415/1000
```

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0s - loss: 6381870.4031 - acc: 5.8514e-04
Epoch 416/1000
0s - loss: 6332753.2385 - acc: 8.1919e-04
Epoch 417/1000
0s - loss: 6289591.9579 - acc: 5.8514e-04
Epoch 418/1000
0s - loss: 6262212.6365 - acc: 3.5108e-04
Epoch 419/1000
0s - loss: 6224126.3277 - acc: 9.3622e-04
Epoch 420/1000
0s - loss: 6193522.9450 - acc: 4.6811e-04
Epoch 421/1000
0s - loss: 6158357.9111 - acc: 5.8514e-04
Epoch 422/1000
0s - loss: 6122275.0282 - acc: 3.5108e-04
Epoch 423/1000
0s - loss: 7142186.7196 - acc: 4.6811e-04
Epoch 424/1000
0s - loss: 8105693.8090 - acc: 4.6811e-04
Epoch 425/1000
0s - loss: 8058977.8154 - acc: 3.5108e-04
Epoch 426/1000
0s - loss: 8015798.8575 - acc: 2.3406e-04
Epoch 427/1000
0s - loss: 7972106.2787 - acc: 2.3406e-04
Epoch 428/1000
0s - loss: 7927755.6439 - acc: 4.6811e-04
Epoch 429/1000
0s - loss: 7890822.6176 - acc: 3.5108e-04
Epoch 430/1000
0s - loss: 7853070.0162 - acc: 4.6811e-04
Epoch 431/1000
0s - loss: 7803461.0135 - acc: 2.3406e-04
Epoch 432/1000
0s - loss: 7765611.3430 - acc: 9.3622e-04
Epoch 433/1000
0s - loss: 7722946.2295 - acc: 1.1703e-04
Epoch 434/1000
0s - loss: 7686566.3812 - acc: 1.1703e-04
Epoch 435/1000
0s - loss: 7647665.6670 - acc: 2.3406e-04
Epoch 436/1000
0s - loss: 7608895.0876 - acc: 3.5108e-04
Epoch 437/1000
0s - loss: 7567580.0432 - acc: 1.1703e-04
Epoch 438/1000
0s - loss: 7531346.9080 - acc: 5.8514e-04
Epoch 439/1000
```

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0s - loss: 7493616.8166 - acc: 1.1703e-04
Epoch 440/1000
0s - loss: 7458524.0435 - acc: 2.3406e-04
Epoch 441/1000
0s - loss: 7421980.3942 - acc: 1.1703e-04
Epoch 442/1000
0s - loss: 7383884.1908 - acc: 3.5108e-04
Epoch 443/1000
0s - loss: 7352244.5109 - acc: 3.5108e-04
Epoch 444/1000
0s - loss: 7314435.3278 - acc: 9.3622e-04
Epoch 445/1000
0s - loss: 7282577.2607 - acc: 4.6811e-04
Epoch 446/1000
0s - loss: 7249539.6391 - acc: 3.5108e-04
Epoch 447/1000
0s - loss: 7214833.4241 - acc: 8.1919e-04
Epoch 448/1000
0s - loss: 7182000.4469 - acc: 1.1703e-04
Epoch 449/1000
0s - loss: 7149562.6681 - acc: 1.1703e-04
Epoch 450/1000
0s - loss: 7116536.1657 - acc: 1.1703e-04
Epoch 451/1000
0s - loss: 7083443.6736 - acc: 0.0000e+00
Epoch 452/1000
0s - loss: 7054654.6071 - acc: 4.6811e-04
Epoch 453/1000
0s - loss: 7021230.1227 - acc: 3.5108e-04
Epoch 454/1000
0s - loss: 6993866.5787 - acc: 3.5108e-04
Epoch 455/1000
0s - loss: 6966057.7755 - acc: 2.3406e-04
Epoch 456/1000
0s - loss: 6933997.3327 - acc: 4.6811e-04
Epoch 457/1000
0s - loss: 6903793.5870 - acc: 2.3406e-04
Epoch 458/1000
0s - loss: 6876915.2954 - acc: 2.3406e-04
Epoch 459/1000
0s - loss: 6862527.3014 - acc: 2.3406e-04
Epoch 460/1000
0s - loss: 6817133.5005 - acc: 1.1703e-04
Epoch 461/1000
0s - loss: 6792464.9793 - acc: 3.5108e-04
Epoch 462/1000
0s - loss: 6763841.4086 - acc: 1.1703e-04
Epoch 463/1000
```

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0s - loss: 6737857.6154 - acc: 4.6811e-04
Epoch 464/1000
0s - loss: 6760257.4871 - acc: 1.1703e-04
Epoch 465/1000
0s - loss: 6683457.0648 - acc: 2.3406e-04
Epoch 466/1000
0s - loss: 6665566.8115 - acc: 4.6811e-04
Epoch 467/1000
0s - loss: 6639029.2278 - acc: 2.3406e-04
Epoch 468/1000
0s - loss: 6610403.9099 - acc: 8.1919e-04
Epoch 469/1000
0s - loss: 6591871.2050 - acc: 1.1703e-04
Epoch 470/1000
0s - loss: 6576530.8295 - acc: 2.3406e-04
Epoch 471/1000
0s - loss: 6541974.6292 - acc: 4.6811e-04
Epoch 472/1000
0s - loss: 6518584.5369 - acc: 2.3406e-04
Epoch 473/1000
0s - loss: 6523900.7273 - acc: 2.3406e-04
Epoch 474/1000
0s - loss: 6475468.9660 - acc: 4.6811e-04
Epoch 475/1000
0s - loss: 6453537.0454 - acc: 1.1703e-04
Epoch 476/1000
0s - loss: 6433437.8493 - acc: 5.8514e-04
Epoch 477/1000
0s - loss: 6427206.6644 - acc: 2.3406e-04
Epoch 478/1000
0s - loss: 6398237.3759 - acc: 1.1703e-04
Epoch 479/1000
0s - loss: 6393672.4852 - acc: 5.8514e-04
Epoch 480/1000
0s - loss: 6347090.3358 - acc: 3.5108e-04
Epoch 481/1000
0s - loss: 6330502.8670 - acc: 3.5108e-04
Epoch 482/1000
0s - loss: 6331237.6918 - acc: 1.1703e-04
Epoch 483/1000
0s - loss: 6310203.5971 - acc: 1.1703e-04
Epoch 484/1000
0s - loss: 6272101.9670 - acc: 1.1703e-04
Epoch 485/1000
0s - loss: 6297842.4263 - acc: 2.3406e-04
Epoch 486/1000
0s - loss: 6270217.5731 - acc: 4.6811e-04
Epoch 487/1000
```

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0s - loss: 6235815.4042 - acc: 3.5108e-04
Epoch 488/1000
0s - loss: 6229962.2946 - acc: 4.6811e-04
Epoch 489/1000
0s - loss: 6198419.1649 - acc: 2.3406e-04
Epoch 490/1000
0s - loss: 6192940.8152 - acc: 1.1703e-04
Epoch 491/1000
0s - loss: 6214801.0606 - acc: 4.6811e-04
Epoch 492/1000
0s - loss: 6143352.9592 - acc: 7.0217e-04
Epoch 493/1000
0s - loss: 6152668.3085 - acc: 4.6811e-04
Epoch 494/1000
0s - loss: 6112335.1103 - acc: 3.5108e-04
Epoch 495/1000
0s - loss: 6122942.2823 - acc: 4.6811e-04
Epoch 496/1000
0s - loss: 6086865.5428 - acc: 3.5108e-04
Epoch 497/1000
0s - loss: 6076649.3281 - acc: 2.3406e-04
Epoch 498/1000
0s - loss: 6057932.8331 - acc: 2.3406e-04
Epoch 499/1000
0s - loss: 6050805.6771 - acc: 4.6811e-04
Epoch 500/1000
0s - loss: 6038319.4830 - acc: 8.1919e-04
Epoch 501/1000
0s - loss: 6026301.6791 - acc: 1.1703e-04
Epoch 502/1000
0s - loss: 6017079.2521 - acc: 2.3406e-04
Epoch 503/1000
0s - loss: 5993449.4067 - acc: 5.8514e-04
Epoch 504/1000
0s - loss: 6020464.6371 - acc: 4.6811e-04
Epoch 505/1000
0s - loss: 5972118.2379 - acc: 3.5108e-04
Epoch 506/1000
0s - loss: 5952199.4326 - acc: 2.3406e-04
Epoch 507/1000
0s - loss: 5953279.4452 - acc: 1.1703e-04
Epoch 508/1000
0s - loss: 5946624.8801 - acc: 5.8514e-04
Epoch 509/1000
0s - loss: 5934103.1074 - acc: 1.1703e-04
Epoch 510/1000
0s - loss: 5915231.8344 - acc: 2.3406e-04
Epoch 511/1000
```

```
0s - loss: 5909420.5504 - acc: 1.1703e-04
Epoch 512/1000
0s - loss: 5888176.7981 - acc: 3.5108e-04
Epoch 513/1000
0s - loss: 5924222.7304 - acc: 4.6811e-04
Epoch 514/1000
0s - loss: 5884897.0229 - acc: 7.0217e-04
Epoch 515/1000
0s - loss: 5882391.4364 - acc: 4.6811e-04
Epoch 516/1000
0s - loss: 5876178.6029 - acc: 1.1703e-04
Epoch 517/1000
0s - loss: 5849334.1524 - acc: 2.3406e-04
Epoch 518/1000
0s - loss: 5845804.1111 - acc: 2.3406e-04
Epoch 519/1000
0s - loss: 5852784.8114 - acc: 3.5108e-04
Epoch 520/1000
0s - loss: 5824033.4904 - acc: 3.5108e-04
Epoch 521/1000
0s - loss: 5828151.0007 - acc: 0.0000e+00
Epoch 522/1000
0s - loss: 5814644.2550 - acc: 2.3406e-04
Epoch 523/1000
0s - loss: 5787152.2937 - acc: 3.5108e-04
Epoch 524/1000
0s - loss: 5788486.5443 - acc: 3.5108e-04
Epoch 525/1000
0s - loss: 5831450.6621 - acc: 0.0000e+00
Epoch 526/1000
0s - loss: 5767003.3336 - acc: 2.3406e-04
Epoch 527/1000
0s - loss: 5801352.1569 - acc: 3.5108e-04
Epoch 528/1000
0s - loss: 5755564.3615 - acc: 2.3406e-04
Epoch 529/1000
0s - loss: 5771040.8101 - acc: 2.3406e-04
Epoch 530/1000
0s - loss: 5773641.5698 - acc: 3.5108e-04
Epoch 531/1000
0s - loss: 5738264.3265 - acc: 2.3406e-04
Epoch 532/1000
0s - loss: 5766688.4379 - acc: 2.3406e-04
Epoch 533/1000
0s - loss: 5735921.3288 - acc: 3.5108e-04
Epoch 534/1000
0s - loss: 5707605.8852 - acc: 1.1703e-04
Epoch 535/1000
```

```
0s - loss: 5714860.1583 - acc: 2.3406e-04
Epoch 536/1000
0s - loss: 5691773.4637 - acc: 4.6811e-04
Epoch 537/1000
0s - loss: 5713669.2900 - acc: 4.6811e-04
Epoch 538/1000
0s - loss: 5702178.1042 - acc: 2.3406e-04
Epoch 539/1000
0s - loss: 5668586.9658 - acc: 0.0000e+00
Epoch 540/1000
0s - loss: 5668847.5656 - acc: 0.0000e+00
Epoch 541/1000
0s - loss: 7499454.1271 - acc: 0.0000e+00
Epoch 542/1000
0s - loss: 7775490.6296 - acc: 0.0000e+00
Epoch 543/1000
0s - loss: 7761198.7612 - acc: 0.0000e+00
Epoch 544/1000
0s - loss: 7747700.8647 - acc: 3.5108e-04
Epoch 545/1000
0s - loss: 7734927.4308 - acc: 1.1703e-04
Epoch 546/1000
0s - loss: 7722670.7765 - acc: 2.3406e-04
Epoch 547/1000
0s - loss: 7710798.3675 - acc: 3.5108e-04
Epoch 548/1000
0s - loss: 7699206.8230 - acc: 1.1703e-04
Epoch 549/1000
0s - loss: 7687865.6966 - acc: 0.0000e+00
Epoch 550/1000
0s - loss: 7676892.2556 - acc: 1.1703e-04
Epoch 551/1000
0s - loss: 7666198.7314 - acc: 1.1703e-04
Epoch 552/1000
0s - loss: 7655868.1485 - acc: 2.3406e-04
Epoch 553/1000
0s - loss: 7645828.7237 - acc: 0.0000e+00
Epoch 554/1000
0s - loss: 7636090.4612 - acc: 3.5108e-04
Epoch 555/1000
0s - loss: 7626622.5585 - acc: 2.3406e-04
Epoch 556/1000
0s - loss: 7617431.9620 - acc: 2.3406e-04
Epoch 557/1000
0s - loss: 7608511.0465 - acc: 1.1703e-04
Epoch 558/1000
0s - loss: 7599931.0616 - acc: 0.0000e+00
Epoch 559/1000
```

```
0s - loss: 7591577.6785 - acc: 1.1703e-04
Epoch 560/1000
0s - loss: 7583517.9868 - acc: 1.1703e-04
Epoch 561/1000
0s - loss: 7575596.0709 - acc: 0.0000e+00
Epoch 562/1000
0s - loss: 7567866.2049 - acc: 2.3406e-04
Epoch 563/1000
0s - loss: 7560408.4238 - acc: 0.0000e+00
Epoch 564/1000
0s - loss: 7553304.4633 - acc: 1.1703e-04
Epoch 565/1000
0s - loss: 7546455.4004 - acc: 0.0000e+00
Epoch 566/1000
0s - loss: 7539838.6889 - acc: 0.0000e+00
Epoch 567/1000
0s - loss: 7533323.8433 - acc: 0.0000e+00
Epoch 568/1000
0s - loss: 7527071.3875 - acc: 0.0000e+00
Epoch 569/1000
0s - loss: 7521082.2728 - acc: 1.1703e-04
Epoch 570/1000
0s - loss: 7515296.8000 - acc: 1.1703e-04
Epoch 571/1000
0s - loss: 7509648.1435 - acc: 1.1703e-04
Epoch 572/1000
0s - loss: 7504191.8653 - acc: 0.0000e+00
Epoch 573/1000
0s - loss: 7498969.3345 - acc: 3.5108e-04
Epoch 574/1000
0s - loss: 7493946.5878 - acc: 0.0000e+00
Epoch 575/1000
0s - loss: 7489051.8661 - acc: 1.1703e-04
Epoch 576/1000
0s - loss: 7484361.6093 - acc: 2.3406e-04
Epoch 577/1000
0s - loss: 7479799.4609 - acc: 0.0000e+00
Epoch 578/1000
0s - loss: 7475347.1881 - acc: 1.1703e-04
Epoch 579/1000
0s - loss: 7471101.8122 - acc: 2.3406e-04
Epoch 580/1000
0s - loss: 7467015.3903 - acc: 0.0000e+00
Epoch 581/1000
0s - loss: 7463112.6041 - acc: 2.3406e-04
Epoch 582/1000
0s - loss: 7459366.6223 - acc: 0.0000e+00
Epoch 583/1000
```

```
0s - loss: 7455734.0737 - acc: 0.0000e+00
Epoch 584/1000
0s - loss: 7452196.3228 - acc: 2.3406e-04
Epoch 585/1000
0s - loss: 7448811.6220 - acc: 0.0000e+00
Epoch 586/1000
0s - loss: 7445553.8243 - acc: 0.0000e+00
Epoch 587/1000
0s - loss: 7442425.6371 - acc: 0.0000e+00
Epoch 588/1000
0s - loss: 7439427.4350 - acc: 1.1703e-04
Epoch 589/1000
0s - loss: 7436513.7222 - acc: 1.1703e-04
Epoch 590/1000
0s - loss: 7433694.3812 - acc: 1.1703e-04
Epoch 591/1000
0s - loss: 7430971.0468 - acc: 2.3406e-04
Epoch 592/1000
0s - loss: 7428360.5059 - acc: 1.1703e-04
Epoch 593/1000
0s - loss: 7425889.4696 - acc: 0.0000e+00
Epoch 594/1000
0s - loss: 7423495.8986 - acc: 1.1703e-04
Epoch 595/1000
0s - loss: 7421203.9557 - acc: 2.3406e-04
Epoch 596/1000
0s - loss: 7418994.3126 - acc: 0.0000e+00
Epoch 597/1000
0s - loss: 7416886.2614 - acc: 0.0000e+00
Epoch 598/1000
0s - loss: 7414854.4157 - acc: 3.5108e-04
Epoch 599/1000
0s - loss: 7412915.3117 - acc: 0.0000e+00
Epoch 600/1000
0s - loss: 7411023.3331 - acc: 8.1919e-04
Epoch 601/1000
0s - loss: 7409195.7885 - acc: 0.0000e+00
Epoch 602/1000
0s - loss: 7407449.8392 - acc: 8.1919e-04
Epoch 603/1000
0s - loss: 7405744.9327 - acc: 0.0000e+00
Epoch 604/1000
0s - loss: 7404146.4338 - acc: 0.0000e+00
Epoch 605/1000
0s - loss: 7402635.1733 - acc: 4.6811e-04
Epoch 606/1000
0s - loss: 7401187.5518 - acc: 0.0000e+00
Epoch 607/1000
```

```
0s - loss: 7399775.3237 - acc: 2.3406e-04
Epoch 608/1000
0s - loss: 7398380.0455 - acc: 0.0000e+00
Epoch 609/1000
0s - loss: 7397052.2525 - acc: 0.0000e+00
Epoch 610/1000
0s - loss: 7395759.9056 - acc: 2.3406e-04
Epoch 611/1000
0s - loss: 7394529.8913 - acc: 0.0000e+00
Epoch 612/1000
0s - loss: 7393348.2545 - acc: 0.0000e+00
Epoch 613/1000
0s - loss: 7392224.8916 - acc: 9.3622e-04
Epoch 614/1000
0s - loss: 7391141.0922 - acc: 0.0000e+00
Epoch 615/1000
0s - loss: 7390105.5326 - acc: 0.0000e+00
Epoch 616/1000
0s - loss: 7389113.2253 - acc: 7.0217e-04
Epoch 617/1000
0s - loss: 7388152.7351 - acc: 0.0000e+00
Epoch 618/1000
0s - loss: 7387224.9125 - acc: 0.0000e+00
Epoch 619/1000
0s - loss: 7386342.0807 - acc: 5.8514e-04
Epoch 620/1000
0s - loss: 7385503.6240 - acc: 7.0217e-04
Epoch 621/1000
0s - loss: 7384689.9503 - acc: 0.0000e+00
Epoch 622/1000
0s - loss: 7383904.6793 - acc: 0.0000e+00
Epoch 623/1000
0s - loss: 7383137.4254 - acc: 1.1703e-04
Epoch 624/1000
0s - loss: 7382420.8904 - acc: 0.0000e+00
Epoch 625/1000
0s - loss: 7381738.1673 - acc: 0.0000e+00
Epoch 626/1000
0s - loss: 7381094.1970 - acc: 0.0000e+00
Epoch 627/1000
0s - loss: 7380482.2700 - acc: 0.0000e+00
Epoch 628/1000
0s - loss: 7379885.5626 - acc: 0.0000e+00
Epoch 629/1000
0s - loss: 7379308.7250 - acc: 0.0000e+00
Epoch 630/1000
0s - loss: 7378756.3357 - acc: 0.0000e+00
Epoch 631/1000
```

```
0s - loss: 7378221.0607 - acc: 5.8514e-04
Epoch 632/1000
0s - loss: 7377714.1292 - acc: 0.0000e+00
Epoch 633/1000
0s - loss: 7377225.5038 - acc: 0.0000e+00
Epoch 634/1000
0s - loss: 7376738.9898 - acc: 0.0000e+00
Epoch 635/1000
0s - loss: 7376287.1330 - acc: 5.8514e-04
Epoch 636/1000
0s - loss: 7375841.2812 - acc: 4.6811e-04
Epoch 637/1000
0s - loss: 7375420.8214 - acc: 0.0000e+00
Epoch 638/1000
0s - loss: 7375016.1300 - acc: 0.0000e+00
Epoch 639/1000
0s - loss: 7374619.7415 - acc: 0.0000e+00
Epoch 640/1000
0s - loss: 7374242.4038 - acc: 2.3406e-04
Epoch 641/1000
0s - loss: 7373872.1543 - acc: 2.3406e-04
Epoch 642/1000
0s - loss: 7373524.8817 - acc: 0.0000e+00
Epoch 643/1000
0s - loss: 7373187.2139 - acc: 0.0000e+00
Epoch 644/1000
0s - loss: 7372866.5015 - acc: 0.0000e+00
Epoch 645/1000
0s - loss: 7372559.7592 - acc: 8.1919e-04
Epoch 646/1000
0s - loss: 7372270.6696 - acc: 0.0011
Epoch 647/1000
0s - loss: 7371983.4634 - acc: 0.0000e+00
Epoch 648/1000
0s - loss: 7371718.0132 - acc: 0.0000e+00
Epoch 649/1000
0s - loss: 7371456.4083 - acc: 0.0000e+00
Epoch 650/1000
0s - loss: 7371211.7983 - acc: 0.0000e+00
Epoch 651/1000
0s - loss: 7370971.8133 - acc: 7.0217e-04
Epoch 652/1000
0s - loss: 7370750.8599 - acc: 3.5108e-04
Epoch 653/1000
0s - loss: 7370530.3297 - acc: 0.0000e+00
Epoch 654/1000
0s - loss: 7370320.7207 - acc: 0.0000e+00
Epoch 655/1000
```

```
0s - loss: 7370114.6240 - acc: 0.0000e+00
Epoch 656/1000
0s - loss: 7369917.9721 - acc: 0.0000e+00
Epoch 657/1000
0s - loss: 7369732.5401 - acc: 0.0000e+00
Epoch 658/1000
0s - loss: 7369555.1298 - acc: 3.5108e-04
Epoch 659/1000
0s - loss: 7369385.1235 - acc: 8.1919e-04
Epoch 660/1000
0s - loss: 7369226.8037 - acc: 0.0000e+00
Epoch 661/1000
0s - loss: 7369075.0949 - acc: 0.0000e+00
Epoch 662/1000
0s - loss: 7368920.4813 - acc: 0.0000e+00
Epoch 663/1000
0s - loss: 7368779.3830 - acc: 0.0000e+00
Epoch 664/1000
0s - loss: 7368640.2589 - acc: 0.0000e+00
Epoch 665/1000
0s - loss: 7368514.4408 - acc: 0.0000e+00
Epoch 666/1000
0s - loss: 7368385.8934 - acc: 2.3406e-04
Epoch 667/1000
0s - loss: 7368264.3288 - acc: 4.6811e-04
Epoch 668/1000
0s - loss: 7368140.9614 - acc: 0.0000e+00
Epoch 669/1000
0s - loss: 7368030.0072 - acc: 0.0000e+00
Epoch 670/1000
0s - loss: 7367921.9009 - acc: 0.0000e+00
Epoch 671/1000
0s - loss: 7367815.8629 - acc: 0.0000e+00
Epoch 672/1000
0s - loss: 7367714.6649 - acc: 0.0000e+00
Epoch 673/1000
0s - loss: 7367623.1153 - acc: 0.0000e+00
Epoch 674/1000
0s - loss: 7367533.7139 - acc: 0.0000e+00
Epoch 675/1000
0s - loss: 7367440.9293 - acc: 0.0000e+00
Epoch 676/1000
0s - loss: 7367356.2039 - acc: 2.3406e-04
Epoch 677/1000
0s - loss: 7367275.4441 - acc: 7.0217e-04
Epoch 678/1000
0s - loss: 7367197.6671 - acc: 0.0000e+00
Epoch 679/1000
```

```
0s - loss: 7367119.4843 - acc: 0.0000e+00
Epoch 680/1000
0s - loss: 7367056.7477 - acc: 0.0000e+00
Epoch 681/1000
0s - loss: 7366983.6213 - acc: 0.0000e+00
Epoch 682/1000
0s - loss: 7366918.8912 - acc: 0.0000e+00
Epoch 683/1000
0s - loss: 7366856.3275 - acc: 0.0000e+00
Epoch 684/1000
0s - loss: 7366793.9700 - acc: 0.0000e+00
Epoch 685/1000
0s - loss: 7366735.6448 - acc: 0.0000e+00
Epoch 686/1000
0s - loss: 7366683.6960 - acc: 0.0000e+00
Epoch 687/1000
0s - loss: 7366626.3596 - acc: 0.0000e+00
Epoch 688/1000
0s - loss: 7366576.0854 - acc: 1.1703e-04
Epoch 689/1000
0s - loss: 7366532.5380 - acc: 7.0217e-04
Epoch 690/1000
0s - loss: 7366480.2000 - acc: 3.5108e-04
Epoch 691/1000
0s - loss: 7366437.3659 - acc: 0.0000e+00
Epoch 692/1000
0s - loss: 7366398.3928 - acc: 0.0000e+00
Epoch 693/1000
0s - loss: 7366351.8386 - acc: 0.0000e+00
Epoch 694/1000
0s - loss: 7366312.5961 - acc: 0.0000e+00
Epoch 695/1000
0s - loss: 7366267.0750 - acc: 0.0000e+00
Epoch 696/1000
0s - loss: 7366235.0490 - acc: 0.0000e+00
Epoch 697/1000
0s - loss: 7366199.6312 - acc: 0.0000e+00
Epoch 698/1000
0s - loss: 7366163.7112 - acc: 0.0000e+00
Epoch 699/1000
0s - loss: 7366141.3325 - acc: 0.0000e+00
Epoch 700/1000
0s - loss: 7366106.1997 - acc: 0.0000e+00
Epoch 701/1000
0s - loss: 7366074.6788 - acc: 0.0000e+00
Epoch 702/1000
0s - loss: 7366045.8515 - acc: 0.0000e+00
Epoch 703/1000
```

```
0s - loss: 7366021.4231 - acc: 1.1703e-04
Epoch 704/1000
0s - loss: 7365997.6897 - acc: 2.3406e-04
Epoch 705/1000
0s - loss: 7365976.7921 - acc: 1.1703e-04
Epoch 706/1000
0s - loss: 7365947.5971 - acc: 8.1919e-04
Epoch 707/1000
0s - loss: 7365926.7599 - acc: 8.1919e-04
Epoch 708/1000
0s - loss: 7365903.5314 - acc: 3.5108e-04
Epoch 709/1000
0s - loss: 7365886.0026 - acc: 2.3406e-04
Epoch 710/1000
0s - loss: 7365864.0253 - acc: 0.0000e+00
Epoch 711/1000
0s - loss: 7365848.6665 - acc: 0.0000e+00
Epoch 712/1000
0s - loss: 7365821.0311 - acc: 0.0000e+00
Epoch 713/1000
0s - loss: 7365804.6878 - acc: 0.0000e+00
Epoch 714/1000
0s - loss: 7365787.2501 - acc: 0.0000e+00
Epoch 715/1000
0s - loss: 7365772.8271 - acc: 0.0000e+00
Epoch 716/1000
0s - loss: 7365757.4571 - acc: 0.0000e+00
Epoch 717/1000
0s - loss: 7365740.0259 - acc: 0.0000e+00
Epoch 718/1000
0s - loss: 7365729.3439 - acc: 0.0000e+00
Epoch 719/1000
0s - loss: 7365715.3169 - acc: 0.0000e+00
Epoch 720/1000
0s - loss: 7365700.7949 - acc: 0.0000e+00
Epoch 721/1000
0s - loss: 7365685.9320 - acc: 0.0000e+00
Epoch 722/1000
0s - loss: 7365674.6309 - acc: 0.0000e+00
Epoch 723/1000
0s - loss: 7365661.2998 - acc: 0.0000e+00
Epoch 724/1000
0s - loss: 7365654.6356 - acc: 0.0000e+00
Epoch 725/1000
0s - loss: 7365640.1785 - acc: 0.0000e+00
Epoch 726/1000
0s - loss: 7365629.2082 - acc: 1.1703e-04
Epoch 727/1000
```

```
0s - loss: 7365623.0427 - acc: 2.3406e-04
Epoch 728/1000
0s - loss: 7365609.1100 - acc: 4.6811e-04
Epoch 729/1000
0s - loss: 7365599.3856 - acc: 3.5108e-04
Epoch 730/1000
0s - loss: 7365593.1055 - acc: 2.3406e-04
Epoch 731/1000
0s - loss: 7365583.1358 - acc: 9.3622e-04
Epoch 732/1000
0s - loss: 7365578.1229 - acc: 5.8514e-04
Epoch 733/1000
0s - loss: 7365573.4801 - acc: 9.3622e-04
Epoch 734/1000
0s - loss: 7365562.5993 - acc: 7.0217e-04
Epoch 735/1000
0s - loss: 7365553.3808 - acc: 4.6811e-04
Epoch 736/1000
0s - loss: 7365547.1166 - acc: 2.3406e-04
Epoch 737/1000
0s - loss: 7365544.1036 - acc: 2.3406e-04
Epoch 738/1000
0s - loss: 7365535.4032 - acc: 0.0000e+00
Epoch 739/1000
0s - loss: 7365530.6260 - acc: 0.0000e+00
Epoch 740/1000
0s - loss: 7365521.2896 - acc: 0.0000e+00
Epoch 741/1000
0s - loss: 7365521.5505 - acc: 0.0000e+00
Epoch 742/1000
0s - loss: 7365513.8774 - acc: 0.0000e+00
Epoch 743/1000
0s - loss: 7365512.6240 - acc: 0.0000e+00
Epoch 744/1000
0s - loss: 7365505.4343 - acc: 0.0000e+00
Epoch 745/1000
0s - loss: 7365502.2414 - acc: 0.0000e+00
Epoch 746/1000
0s - loss: 7365494.0674 - acc: 0.0000e+00
Epoch 747/1000
0s - loss: 7365491.2206 - acc: 0.0000e+00
Epoch 748/1000
0s - loss: 7365487.0556 - acc: 0.0000e+00
Epoch 749/1000
0s - loss: 7365483.5183 - acc: 0.0000e+00
Epoch 750/1000
0s - loss: 7365481.4198 - acc: 0.0000e+00
Epoch 751/1000
```

```
0s - loss: 7365474.1262 - acc: 0.0000e+00
Epoch 752/1000
0s - loss: 7365474.2585 - acc: 0.0000e+00
Epoch 753/1000
0s - loss: 7365475.0026 - acc: 0.0000e+00
Epoch 754/1000
0s - loss: 7365470.2259 - acc: 0.0000e+00
Epoch 755/1000
0s - loss: 7365466.4350 - acc: 0.0000e+00
Epoch 756/1000
0s - loss: 7365465.9236 - acc: 0.0000e+00
Epoch 757/1000
0s - loss: 7365460.0407 - acc: 0.0000e+00
Epoch 758/1000
0s - loss: 7365454.1947 - acc: 0.0000e+00
Epoch 759/1000
0s - loss: 7365455.4040 - acc: 0.0000e+00
Epoch 760/1000
0s - loss: 7365450.4427 - acc: 0.0000e+00
Epoch 761/1000
0s - loss: 7365446.8593 - acc: 0.0000e+00
Epoch 762/1000
0s - loss: 7365444.2737 - acc: 0.0000e+00
Epoch 763/1000
0s - loss: 7365448.4427 - acc: 0.0000e+00
Epoch 764/1000
0s - loss: 7365438.3666 - acc: 0.0000e+00
Epoch 765/1000
0s - loss: 7365441.6492 - acc: 0.0000e+00
Epoch 766/1000
0s - loss: 7365440.6255 - acc: 0.0000e+00
Epoch 767/1000
0s - loss: 7365432.7715 - acc: 0.0000e+00
Epoch 768/1000
0s - loss: 7365431.7472 - acc: 0.0000e+00
Epoch 769/1000
0s - loss: 7365432.9140 - acc: 0.0000e+00
Epoch 770/1000
0s - loss: 7365428.0658 - acc: 0.0000e+00
Epoch 771/1000
0s - loss: 7365428.0734 - acc: 0.0000e+00
Epoch 772/1000
0s - loss: 7365428.4972 - acc: 0.0000e+00
Epoch 773/1000
0s - loss: 7365426.5540 - acc: 0.0000e+00
Epoch 774/1000
0s - loss: 7365424.5881 - acc: 0.0000e+00
Epoch 775/1000
```

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0s - loss: 7365421.4002 - acc: 0.0000e+00
Epoch 776/1000
0s - loss: 7365423.3844 - acc: 0.0000e+00
Epoch 777/1000
0s - loss: 7365418.6128 - acc: 0.0000e+00
Epoch 778/1000
0s - loss: 7365417.8542 - acc: 2.3406e-04
Epoch 779/1000
0s - loss: 7365421.1442 - acc: 0.0000e+00
Epoch 780/1000
0s - loss: 7365414.7165 - acc: 0.0000e+00
Epoch 781/1000
0s - loss: 7365422.3256 - acc: 2.3406e-04
Epoch 782/1000
0s - loss: 7365412.9413 - acc: 2.3406e-04
Epoch 783/1000
0s - loss: 7365412.2557 - acc: 3.5108e-04
Epoch 784/1000
0s - loss: 7365413.4570 - acc: 2.3406e-04
Epoch 785/1000
0s - loss: 7365410.3669 - acc: 3.5108e-04
Epoch 786/1000
0s - loss: 7365406.0859 - acc: 8.1919e-04
Epoch 787/1000
0s - loss: 7365411.1577 - acc: 0.0013
Epoch 788/1000
0s - loss: 7365409.4533 - acc: 4.6811e-04
Epoch 789/1000
0s - loss: 7365409.0173 - acc: 5.8514e-04
Epoch 790/1000
0s - loss: 7365409.3621 - acc: 0.0014
Epoch 791/1000
0s - loss: 7365405.4171 - acc: 0.0012
Epoch 792/1000
0s - loss: 7365410.2725 - acc: 0.0013
Epoch 793/1000
0s - loss: 7365410.8719 - acc: 0.0015
Epoch 794/1000
0s - loss: 7365402.9588 - acc: 0.0014
Epoch 795/1000
0s - loss: 7365405.0971 - acc: 0.0014
Epoch 796/1000
0s - loss: 7365405.7172 - acc: 0.0013
Epoch 797/1000
0s - loss: 7365406.7336 - acc: 0.0014
Epoch 798/1000
0s - loss: 7365408.1318 - acc: 0.0014
Epoch 799/1000
```

```
0s - loss: 7365404.5785 - acc: 0.0013
Epoch 800/1000
0s - loss: 7365403.2118 - acc: 0.0013
Epoch 801/1000
0s - loss: 7365402.1183 - acc: 3.5108e-04
Epoch 802/1000
0s - loss: 7365400.7959 - acc: 5.8514e-04
Epoch 803/1000
0s - loss: 7365402.4393 - acc: 4.6811e-04
Epoch 804/1000
0s - loss: 7365401.5294 - acc: 2.3406e-04
Epoch 805/1000
0s - loss: 7365406.2999 - acc: 3.5108e-04
Epoch 806/1000
0s - loss: 7365400.7348 - acc: 4.6811e-04
Epoch 807/1000
0s - loss: 7365398.9797 - acc: 2.3406e-04
Epoch 808/1000
0s - loss: 7365398.0863 - acc: 2.3406e-04
Epoch 809/1000
0s - loss: 7365397.8739 - acc: 2.3406e-04
Epoch 810/1000
0s - loss: 7365397.7943 - acc: 2.3406e-04
Epoch 811/1000
0s - loss: 7365396.8324 - acc: 2.3406e-04
Epoch 812/1000
0s - loss: 7365396.0031 - acc: 2.3406e-04
Epoch 813/1000
0s - loss: 7365393.9953 - acc: 2.3406e-04
Epoch 814/1000
0s - loss: 7365398.5047 - acc: 2.3406e-04
Epoch 815/1000
0s - loss: 7365395.5915 - acc: 1.1703e-04
Epoch 816/1000
0s - loss: 7365395.9842 - acc: 2.3406e-04
Epoch 817/1000
0s - loss: 7365396.8243 - acc: 2.3406e-04
Epoch 818/1000
0s - loss: 7365396.4737 - acc: 1.1703e-04
Epoch 819/1000
0s - loss: 7365394.6733 - acc: 0.0000e+00
Epoch 820/1000
0s - loss: 7365392.2383 - acc: 0.0000e+00
Epoch 821/1000
0s - loss: 7365400.3681 - acc: 1.1703e-04
Epoch 822/1000
0s - loss: 7365398.9936 - acc: 1.1703e-04
Epoch 823/1000
```

```
0s - loss: 7365401.8707 - acc: 0.0000e+00
Epoch 824/1000
0s - loss: 7365396.8836 - acc: 0.0000e+00
Epoch 825/1000
0s - loss: 7365395.1483 - acc: 0.0000e+00
Epoch 826/1000
0s - loss: 7365391.3739 - acc: 0.0000e+00
Epoch 827/1000
0s - loss: 7365393.3360 - acc: 0.0000e+00
Epoch 828/1000
0s - loss: 7365396.3114 - acc: 1.1703e-04
Epoch 829/1000
0s - loss: 7365399.6537 - acc: 0.0000e+00
Epoch 830/1000
0s - loss: 7365393.8847 - acc: 0.0000e+00
Epoch 831/1000
0s - loss: 7365398.6186 - acc: 0.0000e+00
Epoch 832/1000
0s - loss: 7365396.2535 - acc: 0.0000e+00
Epoch 833/1000
0s - loss: 7365395.2787 - acc: 0.0000e+00
Epoch 834/1000
0s - loss: 7365401.1047 - acc: 0.0000e+00
Epoch 835/1000
0s - loss: 7365393.8275 - acc: 0.0000e+00
Epoch 836/1000
0s - loss: 7365392.1324 - acc: 0.0000e+00
Epoch 837/1000
0s - loss: 7365391.1817 - acc: 0.0000e+00
Epoch 838/1000
0s - loss: 7365391.8755 - acc: 0.0000e+00
Epoch 839/1000
0s - loss: 7365394.8312 - acc: 0.0000e+00
Epoch 840/1000
0s - loss: 7365392.3773 - acc: 0.0000e+00
Epoch 841/1000
0s - loss: 7365396.9114 - acc: 0.0000e+00
Epoch 842/1000
0s - loss: 7365390.7829 - acc: 0.0000e+00
Epoch 843/1000
0s - loss: 7365392.9662 - acc: 0.0000e+00
Epoch 844/1000
0s - loss: 7365392.0363 - acc: 0.0000e+00
Epoch 845/1000
0s - loss: 7365393.7399 - acc: 0.0000e+00
Epoch 846/1000
0s - loss: 7365392.4552 - acc: 0.0000e+00
Epoch 847/1000
```

```
0s - loss: 7365394.7020 - acc: 0.0000e+00
Epoch 848/1000
0s - loss: 7365393.5611 - acc: 0.0000e+00
Epoch 849/1000
0s - loss: 7365393.9417 - acc: 0.0000e+00
Epoch 850/1000
0s - loss: 7365395.3983 - acc: 0.0000e+00
Epoch 851/1000
0s - loss: 7365394.5174 - acc: 0.0000e+00
Epoch 852/1000
0s - loss: 7365391.2491 - acc: 0.0000e+00
Epoch 853/1000
0s - loss: 7365392.3790 - acc: 0.0000e+00
Epoch 854/1000
0s - loss: 7365394.4402 - acc: 0.0000e+00
Epoch 855/1000
0s - loss: 7365393.0958 - acc: 0.0000e+00
Epoch 856/1000
0s - loss: 7365395.6123 - acc: 0.0000e+00
Epoch 857/1000
0s - loss: 7365393.2124 - acc: 0.0000e+00
Epoch 858/1000
0s - loss: 7365393.8833 - acc: 0.0000e+00
Epoch 859/1000
0s - loss: 7365394.7014 - acc: 0.0000e+00
Epoch 860/1000
0s - loss: 7365392.8669 - acc: 0.0000e+00
Epoch 861/1000
0s - loss: 7365396.9996 - acc: 0.0000e+00
Epoch 862/1000
0s - loss: 7365391.0151 - acc: 0.0000e+00
Epoch 863/1000
0s - loss: 7365395.0967 - acc: 0.0000e+00
Epoch 864/1000
0s - loss: 7365393.4962 - acc: 0.0000e+00
Epoch 865/1000
0s - loss: 7365397.3117 - acc: 0.0000e+00
Epoch 866/1000
0s - loss: 7365395.0149 - acc: 0.0000e+00
Epoch 867/1000
0s - loss: 7365394.2254 - acc: 0.0000e+00
Epoch 868/1000
0s - loss: 7365393.7115 - acc: 0.0000e+00
Epoch 869/1000
0s - loss: 7365391.4918 - acc: 0.0000e+00
Epoch 870/1000
0s - loss: 7365392.5016 - acc: 0.0000e+00
Epoch 871/1000
```

```
0s - loss: 7365392.7648 - acc: 0.0000e+00
Epoch 872/1000
0s - loss: 7365389.1801 - acc: 0.0000e+00
Epoch 873/1000
0s - loss: 7365391.1233 - acc: 0.0000e+00
Epoch 874/1000
0s - loss: 7365392.3951 - acc: 0.0000e+00
Epoch 875/1000
0s - loss: 7365392.3980 - acc: 0.0000e+00
Epoch 876/1000
0s - loss: 7365391.7525 - acc: 0.0000e+00
Epoch 877/1000
0s - loss: 7365389.6628 - acc: 0.0000e+00
Epoch 878/1000
0s - loss: 7365392.3967 - acc: 0.0000e+00
Epoch 879/1000
0s - loss: 7365392.1126 - acc: 0.0000e+00
Epoch 880/1000
0s - loss: 7365394.9871 - acc: 0.0000e+00
Epoch 881/1000
0s - loss: 7365393.1460 - acc: 0.0000e+00
Epoch 882/1000
0s - loss: 7365392.3850 - acc: 0.0000e+00
Epoch 883/1000
0s - loss: 7365393.6635 - acc: 0.0000e+00
Epoch 884/1000
0s - loss: 7365399.5097 - acc: 0.0000e+00
Epoch 885/1000
0s - loss: 7365388.9974 - acc: 0.0000e+00
Epoch 886/1000
0s - loss: 7365391.3264 - acc: 0.0000e+00
Epoch 887/1000
0s - loss: 7365393.1483 - acc: 0.0000e+00
Epoch 888/1000
0s - loss: 7365392.3798 - acc: 0.0000e+00
Epoch 889/1000
0s - loss: 7365391.5184 - acc: 0.0000e+00
Epoch 890/1000
0s - loss: 7365395.2177 - acc: 0.0000e+00
Epoch 891/1000
0s - loss: 7365391.2527 - acc: 0.0000e+00
Epoch 892/1000
0s - loss: 7365392.0101 - acc: 0.0000e+00
Epoch 893/1000
0s - loss: 7365394.0032 - acc: 0.0000e+00
Epoch 894/1000
0s - loss: 7365396.9206 - acc: 0.0000e+00
Epoch 895/1000
```

```
0s - loss: 7365391.6916 - acc: 0.0000e+00
Epoch 896/1000
0s - loss: 7365393.9293 - acc: 0.0000e+00
Epoch 897/1000
0s - loss: 7365392.8803 - acc: 0.0000e+00
Epoch 898/1000
0s - loss: 7365394.4522 - acc: 0.0000e+00
Epoch 899/1000
0s - loss: 7365392.9116 - acc: 0.0000e+00
Epoch 900/1000
0s - loss: 7365392.4804 - acc: 0.0000e+00
Epoch 901/1000
0s - loss: 7365391.1015 - acc: 0.0000e+00
Epoch 902/1000
0s - loss: 7365394.0041 - acc: 0.0000e+00
Epoch 903/1000
0s - loss: 7365395.7845 - acc: 0.0000e+00
Epoch 904/1000
0s - loss: 7365392.1776 - acc: 0.0000e+00
Epoch 905/1000
0s - loss: 7365387.9835 - acc: 0.0000e+00
Epoch 906/1000
0s - loss: 7365391.4696 - acc: 0.0000e+00
Epoch 907/1000
0s - loss: 7365394.6792 - acc: 0.0000e+00
Epoch 908/1000
0s - loss: 7365394.4808 - acc: 0.0000e+00
Epoch 909/1000
0s - loss: 7365394.1638 - acc: 0.0000e+00
Epoch 910/1000
0s - loss: 7365393.8389 - acc: 0.0000e+00
Epoch 911/1000
0s - loss: 7365389.9970 - acc: 0.0000e+00
Epoch 912/1000
0s - loss: 7365392.3348 - acc: 0.0000e+00
Epoch 913/1000
0s - loss: 7365390.8975 - acc: 0.0000e+00
Epoch 914/1000
0s - loss: 7365394.4974 - acc: 0.0000e+00
Epoch 915/1000
0s - loss: 7365389.0568 - acc: 0.0000e+00
Epoch 916/1000
0s - loss: 7365392.4605 - acc: 0.0000e+00
Epoch 917/1000
0s - loss: 7365389.9792 - acc: 0.0000e+00
Epoch 918/1000
0s - loss: 7365395.0078 - acc: 0.0000e+00
Epoch 919/1000
```

```
0s - loss: 7365395.9601 - acc: 0.0000e+00
Epoch 920/1000
0s - loss: 7365393.1434 - acc: 0.0000e+00
Epoch 921/1000
0s - loss: 7365391.4244 - acc: 0.0000e+00
Epoch 922/1000
0s - loss: 7365393.9631 - acc: 0.0000e+00
Epoch 923/1000
0s - loss: 7365390.3799 - acc: 0.0000e+00
Epoch 924/1000
0s - loss: 7365392.1233 - acc: 0.0000e+00
Epoch 925/1000
0s - loss: 7365391.7191 - acc: 0.0000e+00
Epoch 926/1000
0s - loss: 7365394.9296 - acc: 0.0000e+00
Epoch 927/1000
0s - loss: 7365392.4882 - acc: 0.0000e+00
Epoch 928/1000
0s - loss: 7365389.7825 - acc: 0.0000e+00
Epoch 929/1000
0s - loss: 7365393.8743 - acc: 0.0000e+00
Epoch 930/1000
0s - loss: 7365393.8606 - acc: 0.0000e+00
Epoch 931/1000
0s - loss: 7365391.0358 - acc: 0.0000e+00
Epoch 932/1000
0s - loss: 7365395.6252 - acc: 0.0000e+00
Epoch 933/1000
0s - loss: 7365399.0471 - acc: 0.0000e+00
Epoch 934/1000
0s - loss: 7365394.7711 - acc: 0.0000e+00
Epoch 935/1000
0s - loss: 7365393.6774 - acc: 0.0000e+00
Epoch 936/1000
0s - loss: 7365395.4282 - acc: 0.0000e+00
Epoch 937/1000
0s - loss: 7365391.3903 - acc: 0.0000e+00
Epoch 938/1000
0s - loss: 7365390.8523 - acc: 0.0000e+00
Epoch 939/1000
0s - loss: 7365393.5897 - acc: 0.0000e+00
Epoch 940/1000
0s - loss: 7365390.9867 - acc: 0.0000e+00
Epoch 941/1000
0s - loss: 7365394.0881 - acc: 0.0000e+00
Epoch 942/1000
0s - loss: 7365387.9570 - acc: 0.0000e+00
Epoch 943/1000
```

```
0s - loss: 7365393.1081 - acc: 0.0000e+00
Epoch 944/1000
0s - loss: 7365393.1211 - acc: 0.0000e+00
Epoch 945/1000
0s - loss: 7365394.4255 - acc: 0.0000e+00
Epoch 946/1000
0s - loss: 7365388.8990 - acc: 0.0000e+00
Epoch 947/1000
0s - loss: 7365396.5632 - acc: 0.0000e+00
Epoch 948/1000
0s - loss: 7365395.1624 - acc: 0.0000e+00
Epoch 949/1000
0s - loss: 7365391.9803 - acc: 0.0000e+00
Epoch 950/1000
0s - loss: 7365397.1265 - acc: 0.0000e+00
Epoch 951/1000
0s - loss: 7365390.8119 - acc: 0.0000e+00
Epoch 952/1000
0s - loss: 7365390.5745 - acc: 0.0000e+00
Epoch 953/1000
0s - loss: 7365394.8012 - acc: 0.0000e+00
Epoch 954/1000
0s - loss: 7365392.1834 - acc: 0.0000e+00
Epoch 955/1000
0s - loss: 7365389.2504 - acc: 0.0000e+00
Epoch 956/1000
0s - loss: 7365394.0226 - acc: 0.0000e+00
Epoch 957/1000
0s - loss: 7365393.7499 - acc: 0.0000e+00
Epoch 958/1000
0s - loss: 7365397.7766 - acc: 0.0000e+00
Epoch 959/1000
0s - loss: 7365393.3670 - acc: 0.0000e+00
Epoch 960/1000
0s - loss: 7365393.5219 - acc: 0.0000e+00
Epoch 961/1000
0s - loss: 7365389.7295 - acc: 0.0000e+00
Epoch 962/1000
0s - loss: 7365391.6461 - acc: 0.0000e+00
Epoch 963/1000
0s - loss: 7365393.3449 - acc: 0.0000e+00
Epoch 964/1000
0s - loss: 7365394.4978 - acc: 0.0000e+00
Epoch 965/1000
0s - loss: 7365395.4434 - acc: 0.0000e+00
Epoch 966/1000
0s - loss: 7365390.4816 - acc: 0.0000e+00
Epoch 967/1000
```

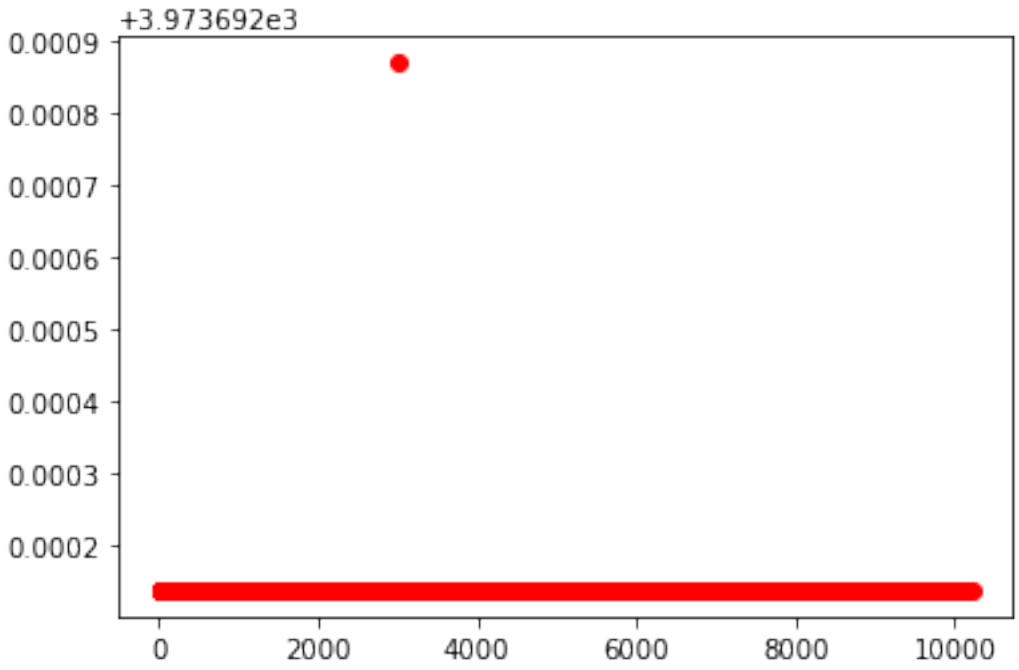
```
0s - loss: 7365398.6441 - acc: 0.0000e+00
Epoch 968/1000
0s - loss: 7365390.5671 - acc: 0.0000e+00
Epoch 969/1000
0s - loss: 7365398.1501 - acc: 0.0000e+00
Epoch 970/1000
0s - loss: 7365393.4459 - acc: 0.0000e+00
Epoch 971/1000
0s - loss: 7365389.0018 - acc: 0.0000e+00
Epoch 972/1000
0s - loss: 7365393.9934 - acc: 0.0000e+00
Epoch 973/1000
0s - loss: 7365392.6987 - acc: 0.0000e+00
Epoch 974/1000
0s - loss: 7365392.0528 - acc: 0.0000e+00
Epoch 975/1000
0s - loss: 7365388.7090 - acc: 0.0000e+00
Epoch 976/1000
0s - loss: 7365391.2199 - acc: 0.0000e+00
Epoch 977/1000
0s - loss: 7365393.8394 - acc: 0.0000e+00
Epoch 978/1000
0s - loss: 7365393.8960 - acc: 0.0000e+00
Epoch 979/1000
0s - loss: 7365389.6027 - acc: 0.0000e+00
Epoch 980/1000
0s - loss: 7365392.7611 - acc: 0.0000e+00
Epoch 981/1000
0s - loss: 7365392.2956 - acc: 0.0000e+00
Epoch 982/1000
0s - loss: 7365393.1902 - acc: 0.0000e+00
Epoch 983/1000
0s - loss: 7365394.7692 - acc: 0.0000e+00
Epoch 984/1000
0s - loss: 7365390.1862 - acc: 0.0000e+00
Epoch 985/1000
0s - loss: 7365405.4871 - acc: 0.0000e+00
Epoch 986/1000
0s - loss: 7365392.1988 - acc: 0.0000e+00
Epoch 987/1000
0s - loss: 7365393.6472 - acc: 0.0000e+00
Epoch 988/1000
0s - loss: 7365392.7229 - acc: 0.0000e+00
Epoch 989/1000
0s - loss: 7365392.6512 - acc: 0.0000e+00
Epoch 990/1000
0s - loss: 7365396.5721 - acc: 0.0000e+00
Epoch 991/1000
```

```
0s - loss: 7365389.9756 - acc: 0.0000e+00
Epoch 992/1000
0s - loss: 7365396.9618 - acc: 0.0000e+00
Epoch 993/1000
0s - loss: 7365393.0124 - acc: 0.0000e+00
Epoch 994/1000
0s - loss: 7365396.6767 - acc: 0.0000e+00
Epoch 995/1000
0s - loss: 7365394.9740 - acc: 0.0000e+00
Epoch 996/1000
0s - loss: 7365393.9438 - acc: 0.0000e+00
Epoch 997/1000
0s - loss: 7365393.2709 - acc: 0.0000e+00
Epoch 998/1000
0s - loss: 7365391.1258 - acc: 0.0000e+00
Epoch 999/1000
0s - loss: 7365391.0841 - acc: 0.0000e+00
Epoch 1000/1000
0s - loss: 7365389.2461 - acc: 0.0000e+00
```

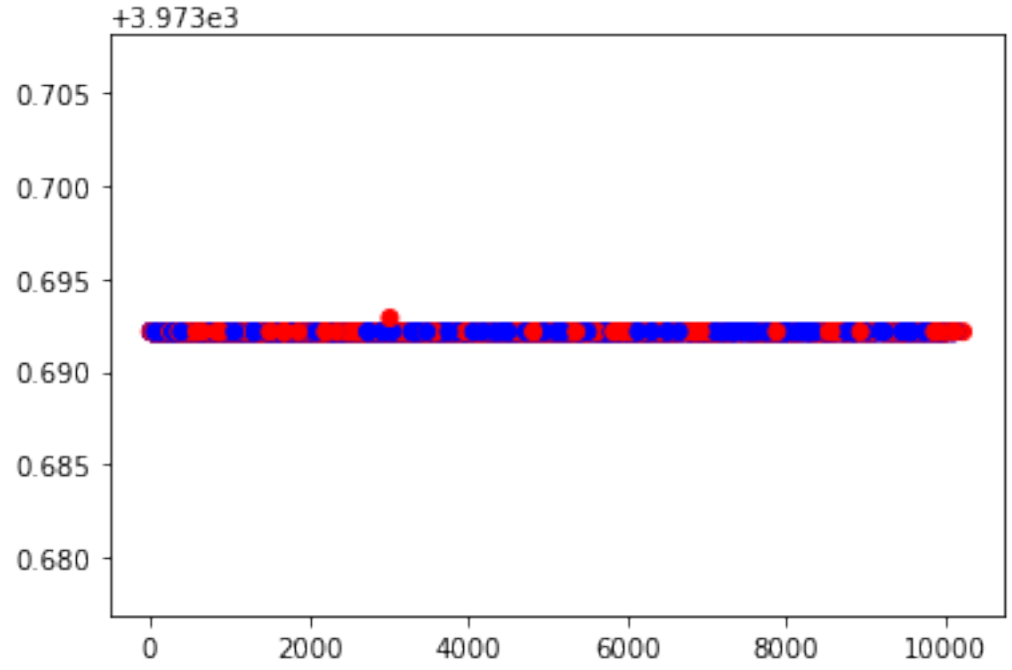
```
In [129]: #Plot actual vs predition for training set
          TestResults = np.genfromtxt("trainresults.csv", delimiter=",")
          plt.plot(Y_train,TestResults,'ro')

          #Compute R-Square value for training set
          TestR2Value = r2_score(Y_train,TestResults)
          print("Training Set R-Square=", TestR2Value)
```

```
Training Set R-Square= -3.14845927107e-11
```



In [130]:
```
plt.scatter(Y_train, TestResults,color=["red", "blue"])
plt.show()
```



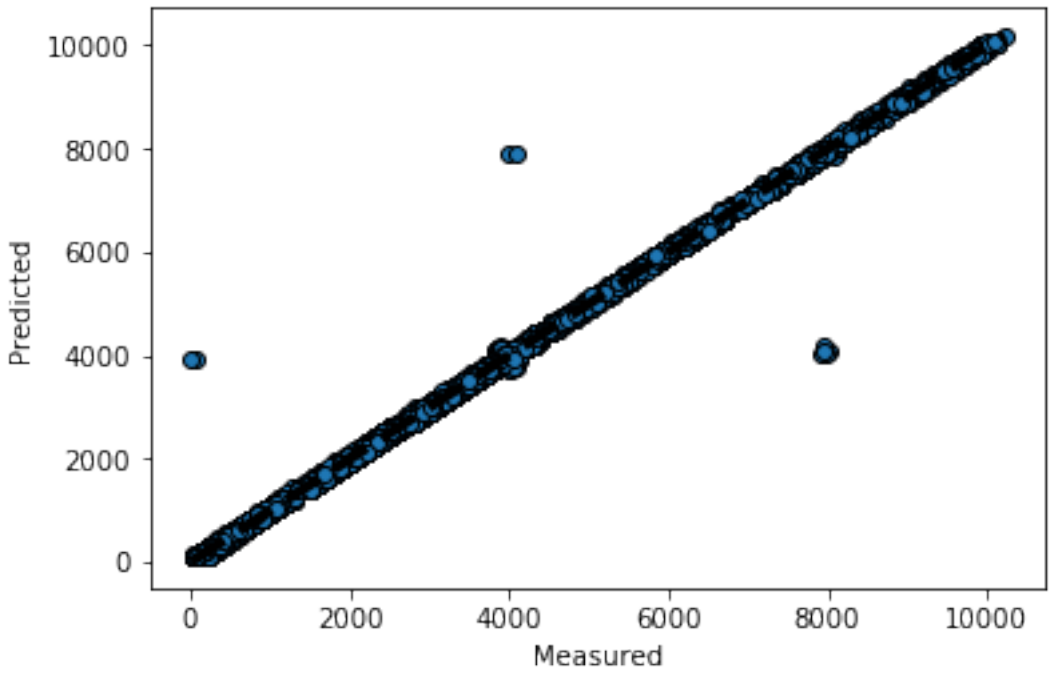
1.11 Another offline model, using sklearn

In [132]:
```
from sklearn.model_selection import cross_val_predict
from sklearn import linear_model

lr = linear_model.LinearRegression()

predicted = cross_val_predict(lr, X_train, Y_train, cv=10)
```

In [135]:
```
fig, ax = plt.subplots()
ax.scatter(Y_train, predicted, edgecolors=(0, 0, 0))
ax.plot([Y_train.min(), Y_train.max()], [Y_train.min(), Y_train.max()], 'k--', lw=4)
ax.set_xlabel('Measured')
ax.set_ylabel('Predicted')
plt.show()
```



1.12 Comparison MLFD vs EPFD

In [255]:
```
node_crashes_epfd = pd.read_csv('../data/backup/stats_epfd/node_crashes.csv')
node_suspicions_epfd = pd.read_csv('../data/backup/stats_epfd/node_suspicions.csv')
node_suspicions_epfd
node_suspicions_epfd = pd.merge(node_suspicions_epfd, node_crashes_epfd, how="inner",
node_suspicions_epfd = node_suspicions_epfd.sort_values('suspected', ascending=False).
node_suspicions_epfd["detection_time"] = node_suspicions_epfd["suspected"] - node_susp
node_suspicions = node_suspicions[node_suspicions["detection_time"]>0] #Remove prematu
node_suspicions_epfd
```

Out[255]:

	node	suspected	timestamp	detection_time
4	45	1504433437756	1504433427237	10519
11	79	1504433921665	1504433911146	10519
15	42	1504433479836	1504433469317	10519
22	78	1504433574516	1504433563996	10520
25	20	1504433490356	1504433479836	10520
27	4	1504433711275	1504433700756	10519
33	71	1504433490356	1504433479836	10520
41	92	1504433753356	1504433742836	10520
45	34	1504433183715	1504433178697	5018

In [256]:
```
#rtt_data calculate mean per node and merge
mean_rtt_epfd = rtt_data.groupby(['node', 'rtt'], as_index=False).mean().groupby('node
matrix_epfd = mean_rtt.as_matrix
mean_epfd = np.array(mean_rtt_epfd)
```

In [257]:
```
mean_n_epfd = np.zeros(len(node_suspicions_epfd["node"]))
j = 0
for i in range(0, len(mean)):
    if(i in node_suspicions_epfd["node"].values):
        #print(i)
        mean_n_epfd[j] = mean_epfd[i]
        j = j+1
```

In [264]:
```
plt.plot(mean_n_epfd, node_suspicions_epfd["detection_time"], label="EPFD")
plt.plot(mean_n, node_suspicions["detection_time"], label="MLFD")
plt.ylabel('Detection Time')
plt.xlabel('Average RTT')
plt.title('Detection Time of crashes with respect to average RTT')
plt.legend()
plt.show()
```

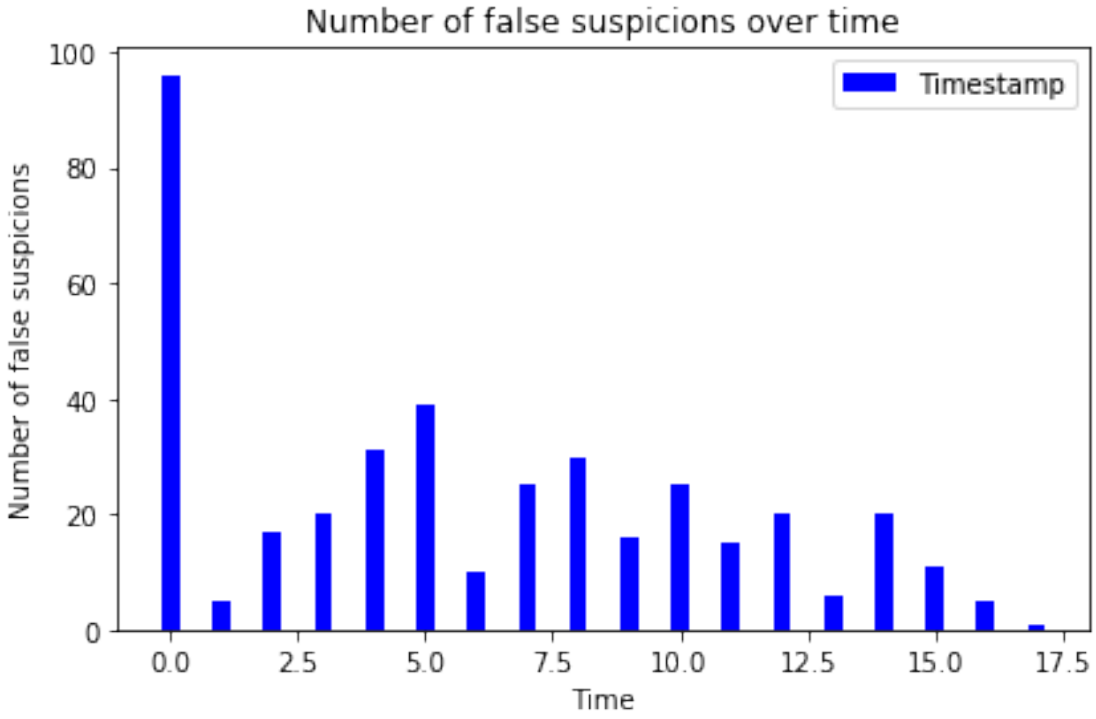

```
In [276]: node_suspicions2_epfd = pd.read_csv('../data/backup/stats_epfd/node_suspicions.csv')
          keys_epfd = ['suspected', "node"]
          i1_epfd = node_suspicions2_epfd.set_index(keys_epfd).index
          i2_epfd = node_suspicions_epfd.set_index(keys_epfd).index
          false_suspicions_epfd = node_suspicions2_epfd[~i1_epfd.isin(i2_epfd)]
          false_suspicions_epfd = false_suspicions_epfd.groupby("suspected").count()
          false_suspicions_epfd
```

Out[276]:

suspected	node
1504433156016	96
1504433159076	5
1504433161096	17
1504433163616	20
1504433166636	31
1504433170156	39
1504433174176	10
1504433178696	25
1504433183715	30
1504433189236	16
1504433195256	25
1504433201776	15
1504433208796	20
1504433216315	6

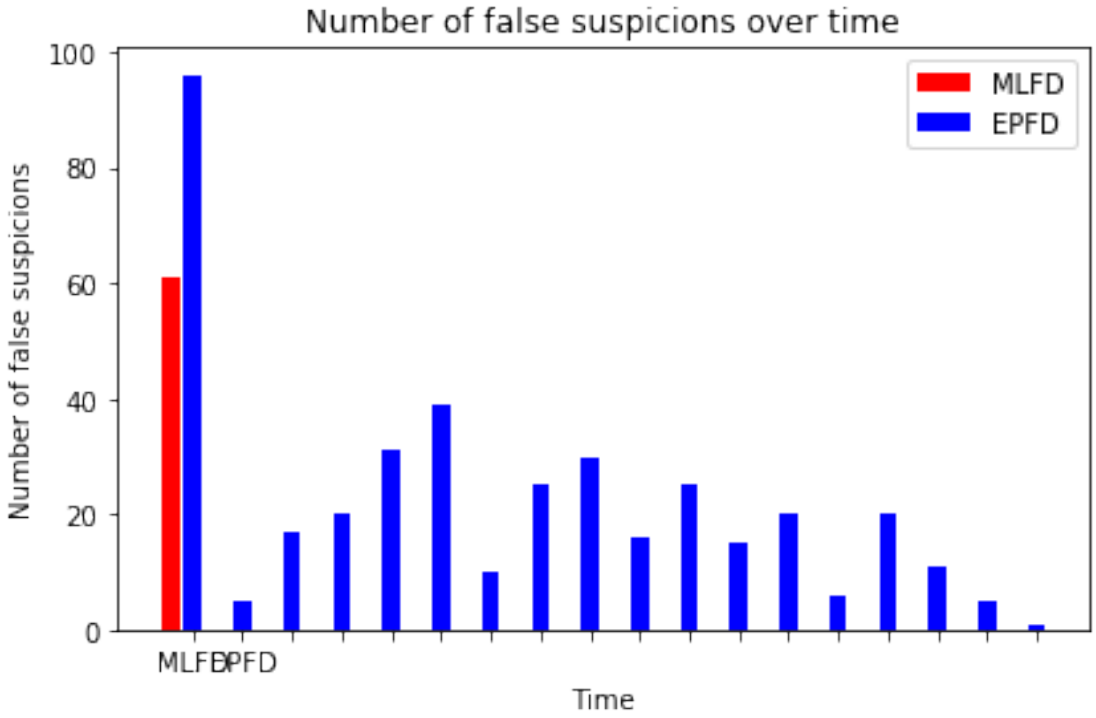
```
1504433224336    20
1504433241876    11
1504433260416     5
1504433269936     1
```

In [297]:
```
epfd_false_suspicions = false_suspicions_epfd.values
l = len(epfd_false_suspicions)
width = 0.35
error_config = {'ecolor': '0.3'}
plt.bar(range(len(epfd_false_suspicions)), epfd_false_suspicions, width=width, color='
plt.xlabel('Time')
plt.ylabel('Number of false suspicions')
plt.title('Number of false suspicions over time')
plt.legend()
plt.tight_layout()
```



In [309]:
```
bar_width = 0.45
index1 = np.arange(l)
index2 = np.arange(len(mlfd_false_suspicions))
plt.bar(index2, mlfd_false_suspicions, width=width, color='r', error_kw=error_config,
plt.bar(index1 + bar_width, epfd_false_suspicions, width=width, color='b', error_kw=er
plt.xlabel('Time')
plt.ylabel('Number of false suspicions')
plt.title('Number of false suspicions over time')
```

```
plt.legend()
plt.xticks(index1 + bar_width, ('MLFD', 'EPFD'))
plt.tight_layout()
```



In [ ]: