**Initial Architecture (Discussion 7 Architecture) - 5/18/2022**

Encoder - 3 hidden layers, Decoder - 3 hidden layers, Batch-size - 4, lr - 1e-3

* 10 epochs per city
* 80/20 Training/Validation Split

Training: final loss (palo alto) - 85585.02703631532

Validation: 209867.5162729818

Submission: 5564.16475

**Deeper Architecture - 5/18/2022**

Encoder - 4 hidden layers, Decoder - 4 hidden layers, Batch-size - 4, lr - 1e-3

* 20 epochs per city
* 80/20 Training/Validation Split
* Added GPU acceleration

Training: final loss (palo alto) - 73952.61728805881

Validation: 122512.03462364046

Submission: 1733.08812

**Change Training/Testing Method - 5/18/2022**

Encoder - 4 hidden layers, Decoder - 4 hidden layers, Batch-size - 4, lr - 1e-3

* 20 epochs per city
* 100/0 Training/Validation Split
* Testing per city, rather than on the whole dataset

Training: final loss (palo alto) - 287019.6210470934

Validation: N/A

Submission: 1658.79962

**Transformer Model - 5/19/2022**

Encoder - 4, Decoder - 4, Batch-size - 4, lr - 0.1, dropout - 0.2, d\_model = 2, nhead = 2

* 5 epochs per city
* 100/0 Training/Validation Split

Training:

*austin*

*Time elapsed: 7.593198478221893*

*epoch 0 loss: 196982018.46488315*

*Time elapsed: 15.17181428273519*

*epoch 1 loss: 181544203.95763022*

*Time elapsed: 22.921051637331644*

*epoch 2 loss: 181507400.42740014*

*Time elapsed: 30.69908484617869*

*epoch 3 loss: 181507017.24751797*

*Time elapsed: 38.16384460528692*

*epoch 4 loss: 181507003.49082237*

*miami*

*Time elapsed: 48.55288451910019*

*epoch 0 loss: 1026971579.2091588*

*Time elapsed: 58.03132556676864*

*epoch 1 loss: 933328099.5034621*

*Time elapsed: 68.36286822954814*

*epoch 2 loss: 930720642.8687719*

*Time elapsed: 78.33688868284226*

*epoch 3 loss: 930577605.0854676*

*Time elapsed: 87.99915175040563*

*epoch 4 loss: 930565862.5793945*

*pittsburgh*

*Time elapsed: 95.661305920283*

*epoch 0 loss: 249492148.59736192*

*Time elapsed: 103.45517633358638*

*epoch 1 loss: 225963374.64082474*

*Time elapsed: 111.3959932923317*

*epoch 2 loss: 225698929.6957579*

*Time elapsed: 119.24318982362747*

*epoch 3 loss: 225696615.12162554*

*Time elapsed: 126.896784055233*

*epoch 4 loss: 225696543.21182418*

*dearborn*

*Time elapsed: 131.36553070147832*

*epoch 0 loss: 1923373592.1946504*

*Time elapsed: 135.68254281282424*

*epoch 1 loss: 1507630860.7828515*

*Time elapsed: 139.9931365609169*

*epoch 2 loss: 1329436127.805364*

*Time elapsed: 144.43818285067877*

*epoch 3 loss: 1261203001.5533829*

*Time elapsed: 148.8357931693395*

*epoch 4 loss: 1235574052.951275*

*washington-dc*

*Time elapsed: 153.5819742043813*

*epoch 0 loss: 540988582.1681263*

*Time elapsed: 158.25107935667037*

*epoch 1 loss: 289921923.79534745*

*Time elapsed: 162.8028089125951*

*epoch 2 loss: 221325877.18644178*

*Time elapsed: 167.35705895026524*

*epoch 3 loss: 212843184.29295886*

*Time elapsed: 172.0782636642456*

*epoch 4 loss: 212438812.45065087*

*palo-alto*

*Time elapsed: 174.29300076166788*

*epoch 0 loss: 1212882064.4125674*

*Time elapsed: 176.43316045602162*

*epoch 1 loss: 919497258.9493331*

*Time elapsed: 178.60580461422603*

*epoch 2 loss: 697678381.1470947*

*Time elapsed: 180.73394995133083*

*epoch 3 loss: 518765077.1416691*

*Time elapsed: 182.89810092051823*

*epoch 4 loss: 379540950.0115853*

Validation: N/A

Submission: N/A

**Linear Model - 5/19/2022**

Encoder - 3 hidden layers, Decoder - 3 hidden layers, Dropout - 0.2, Batch-size - 6, lr - 1e-2

* All cities trained per epoch
* 40 epochs
* 100/0 Split

Training:

*Time elapsed: 79.33233354091644*

*epoch 39 loss: 11214078.961732004*

Validation: N/A

Submission: 13579726.63092

Thus, dropout is no good for this model.

**Linear Model, No Dropout - 5/19/2022**

Encoder - 3 hidden layers, Decoder - 3 hidden layers, Batch-size - 4, lr - 1e-3

* All cities trained per epoch
* 40 epochs
* 100/0 Split

Training:

*Time elapsed: 105.7999827782313*

*epoch 39 loss: 5743.232055564923*

Validation: N/A

Submission: 1591.04730

**SGDRegression - 5/19/2022**

Training: 09:21<00:00, 2099.07it/s

Submission: Not working yet

**Average Distance - 5/20/2022**

Training: No training needed

Submission: 73.87419

**Linear Regression, Individual Prediction - 5/21/2022**

Training:

*Time elapsed: 19.96878539721171*

*epoch 4 loss: 7834.1724788609135*

Submission: 92193.11780

**Linear Regression, Group Prediction - 5/21/2022**

Training:

*Time elapsed: 35.54752346277237*

*epoch 9 loss: 505409.1528050309*

Submission: 9548.50214

**Median Velocity, Acceleration - 5/24/2022**

Submission: 54.05959

**Linear Regression Model Per Output - 5/24/2022**

Training:

*Time elapsed: 60/60 [04:40<00:00, 7.20s/it]*

Submission: 21.58822

**Adaboost Regression - 5/25/2022**

Training:

*60/60 [1:51:29<00:00, 147.26s/it]*

Submission:

**References:**

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