

Task 2: Screenshot of Locust UI running with user and response time curves over training run



The screenshot shows a terminal window with a table of performance metrics for a service named "monitor". The table includes columns for Type, Name, # reqs, # fails, Avg, Min, Max, Med, req/s, and failures/s. The data shows various HTTP requests (GET, POST) to different endpoints like /, /cart, /checkout, and /currency, with response times ranging from 0.02 to 2.39 seconds and failure rates near zero.

Type	Name	# reqs	# fails	Avg	Min	Max	Med	req/s	failures/s
GET	/	2201	20(0.91%)	975	76	600893	440	2.39	0.02
GET	/cart	5768	39(0.68%)	971	67	600893	450	0.63	0.03
POST	/cart	5563	2(0.04%)	773	129	60137	660	5.81	0.00
POST	/cart/checkout	1821	11(0.68%)	422	91	2173	370	1.99	0.01
GET	/product/0PUK6V6EV0	2682	15(0.56%)	878	74	600892	400	2.89	0.02
GET	/product/1YMMWNIN40	2689	15(0.56%)	889	71	600892	400	2.81	0.02
GET	/product/2ZFJ3GMH2N	2709	10(0.35%)	885	71	600892	400	2.81	0.02
GET	/product/6E9ZMYYFZ	2713	15(0.55%)	826	70	600892	410	2.84	0.02
GET	/product/6E9ZMYYFZ	2760	13(0.47%)	780	70	600891	400	2.88	0.01
GET	/product/95IOT8T0J0	2861	13(0.45%)	762	69	600892	400	2.99	0.01
GET	/product/L9ECAVTKIM	2775	21(0.76%)	946	68	600892	400	2.99	0.02
GET	/product/L9ECAVTKIM	2793	21(0.75%)	899	73	600892	400	3.02	0.02
GET	/product/QLUESCF7Z	2795	21(0.75%)	899	71	600892	400	3.24	0.02
POST	/setCurrency	3856	5(0.13%)	639	117	600891	500	4.93	0.01
	Aggregated	44869	219(0.50%)	826	67	60137	440	46.06	0.23

Response time percentiles (approximated)

Type	Name	50%	66%	75%	80%	90%	95%	98%	99%	99.9%	99.99%
GET	/	440	540	670	790	1100	1400	1900	3000	60000	6000
GET	/cart	450	550	610	660	840	1000	1300	1800	60000	6000
POST	/cart	660	770	850	930	1100	1400	1800	2000	3500	6000
POST	/cart/checkout	370	440	470	520	620	800	1100	1400	1900	220
GET	/product/0PUK6V6EV0	400	480	540	590	740	980	1300	1800	60000	6000
GET	/product/1YMMWNIN40	400	480	540	590	740	930	1300	1600	60000	6000
GET	/product/2ZFJ3GMH2N	400	470	520	570	730	930	1300	1700	60000	6000
GET	/product/6E9ZMYYFZ	410	490	540	590	730	950	1300	1600	60000	6000
GET	/product/6E9ZMYYFZ	400	480	520	570	740	940	1300	1500	60000	6000
GET	/product/95IOT8T0J0	400	480	540	590	730	930	1300	1500	60000	6000
GET	/product/L9ECAVTKIM	400	480	540	590	760	980	1400	2100	60000	6000

Task 2: Curl command to pull training data Screenshot of curl command to pull training data and save to file

```
francisberi@beri:~/Desktop/CMU-Africa/Fall2024/apiops/Lab6/Lab5      francisberi@beri:~/Desktop/CMU-Africa/Fall2024/apiops/Lab6/Lab5
francisberi@beri:~/Desktop/CMU-Africa/Fall2024/apiops/Lab6/Lab5$ curl -g -s "http://34.19.125.8:9098/api/v1/query" --data-urlencode "query=histogram_quantile( 0.5, rate(istio_request_duration_milliseconds_bucket[source_app='Frontend', destination_app='shippingservice', reporter='source'][1m])[2h:30s]" | jq -r . | more > boutique_training.json
francisberi@beri:~/Desktop/CMU-Africa/Fall2024/apiops/Lab6/Lab5$ curl -g -s "http://34.19.125.8:9098/api/v1/query" --data-urlencode "query=histogram_quantile( 0.5, rate(istio_request_duration_milliseconds_bucket[source_app='Frontend', destination_app='shippingservice', reporter='source'][1m])[2h:30s]" | jq -r . | more
{
```

```

francisberi@beri: ~/Desktop/CMU-Africa/Fall2024/aiops/Lab6/Lab5
francisberi@beri:~/Desktop/CMU-Africa/Fall2024/aiops/Lab6/Lab5$ curl -g -s "http://34.19.125.8:9990/api/v1/query" -d data=urlencode "query=histogram_quantile( 0.5, rate(istio_request_duration_milliseconds_bucket{source_app='frontend', destination_app='shippingservice', reporter='source'}[1m))[2h30s]" | jq | more > boutique_training.json
francisberi@beri:~/Desktop/CMU-Africa/Fall2024/aiops/Lab6/Lab5$ curl -g -s "http://34.19.125.8:9990/api/v1/query" -d data=urlencode "query=histogram_quantile( 0.5, rate(istio_request_duration_milliseconds_bucket{source_app='frontend', destination_app='shippingservice', reporter='source'}[1m))[2h30s]" | jq | more > boutique_training.json
data was pulled or the current test is run, just that we compare values at the
same times relative to the start of the test so start both at 0 :D

To implement this in your lab: when you read in your training dataset force it to
start with a timestamp of 0 rather than the time of day it was captured. Use a
statement like this:

# reset training data to 0 origin before HMS conversion
df_train['ds'] = df_train['ds'] - df_train['ds'].iloc[0]

Then for comparison with testing values, read the current time of day when the
monitor starts and subtract that from each test value as you pull it from Prometheus. For the dataframe containing the current test value use something like:

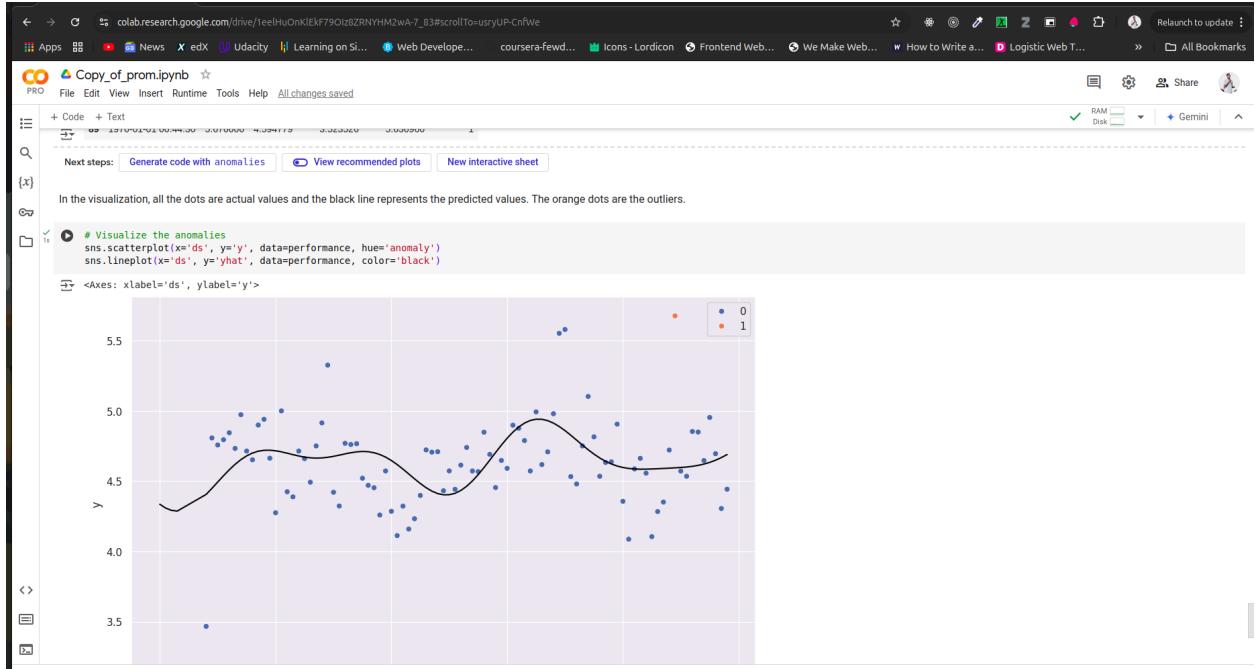
df['ds'] = df['ds'] - test_start_time
df['ds'] = df['ds'].apply(
    lambda sec: datetime.fromtimestamp(sec))

As a result, the test values will start with time stamp 0 just like the training data
and you will be aligned.

Finally, do not forget to start the locust loadgenerator for testing at the same time
(roughly) as the monitor during testing and you're ready to detect any anomalies!

```

Lab Task 2: Review in Jupyter notebook. Screenshot of prom.ipynb graphs showing (1) fit to training data and (2) detected anomalies from passing training data for model predictions (predict based on training data just as sanity test).



Screenshot captured You can paste the image from the clipboard.

File Edit View Insert Runtime Tools Help All changes saved

```
[75]: ds      95 non-null    datetime64[ns]
   1      y      95 non-null    float64
   2     yhat     95 non-null    float64
   3   yhat_lower  95 non-null    float64
   4   yhat_upper  95 non-null    float64
   5   anomaly     95 non-null    int64
dtypes: datetime64[ns](1), float64(4), int64(1)
memory usage: 5.2 KB
```

```
[76]: # Check the number of anomalies
       performance['anomaly'].value_counts()

          count
        anomaly
         0      90
         1       5

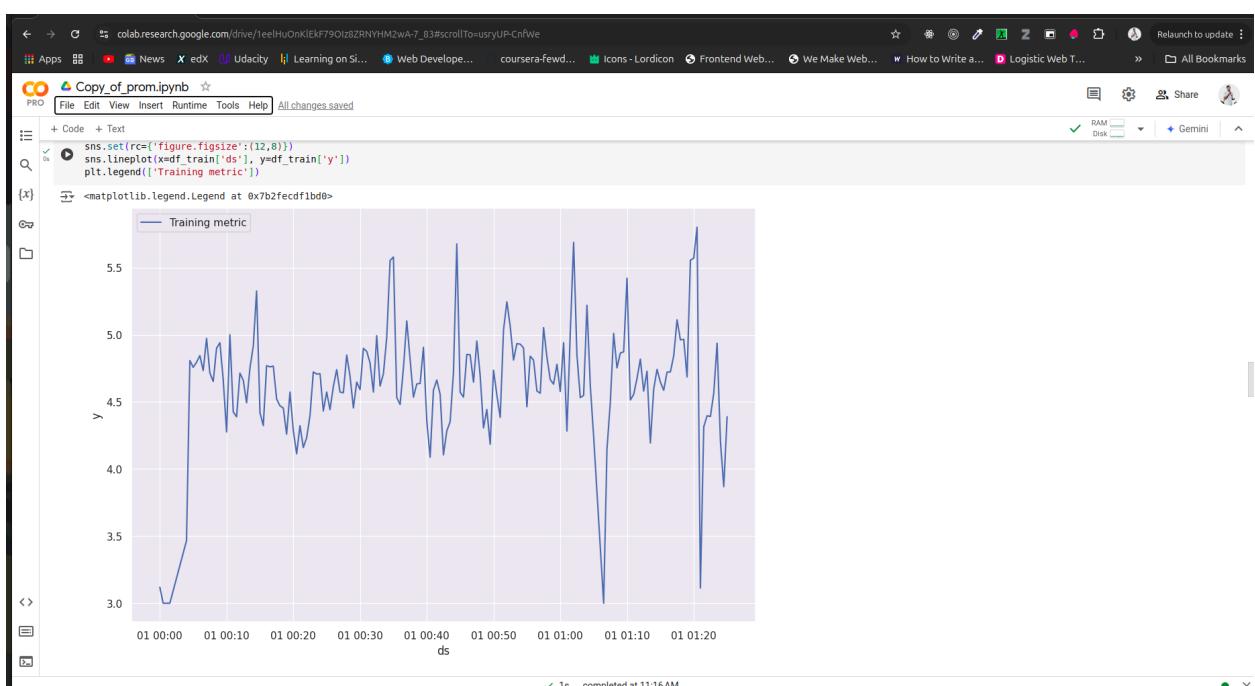
dtype: int64
```

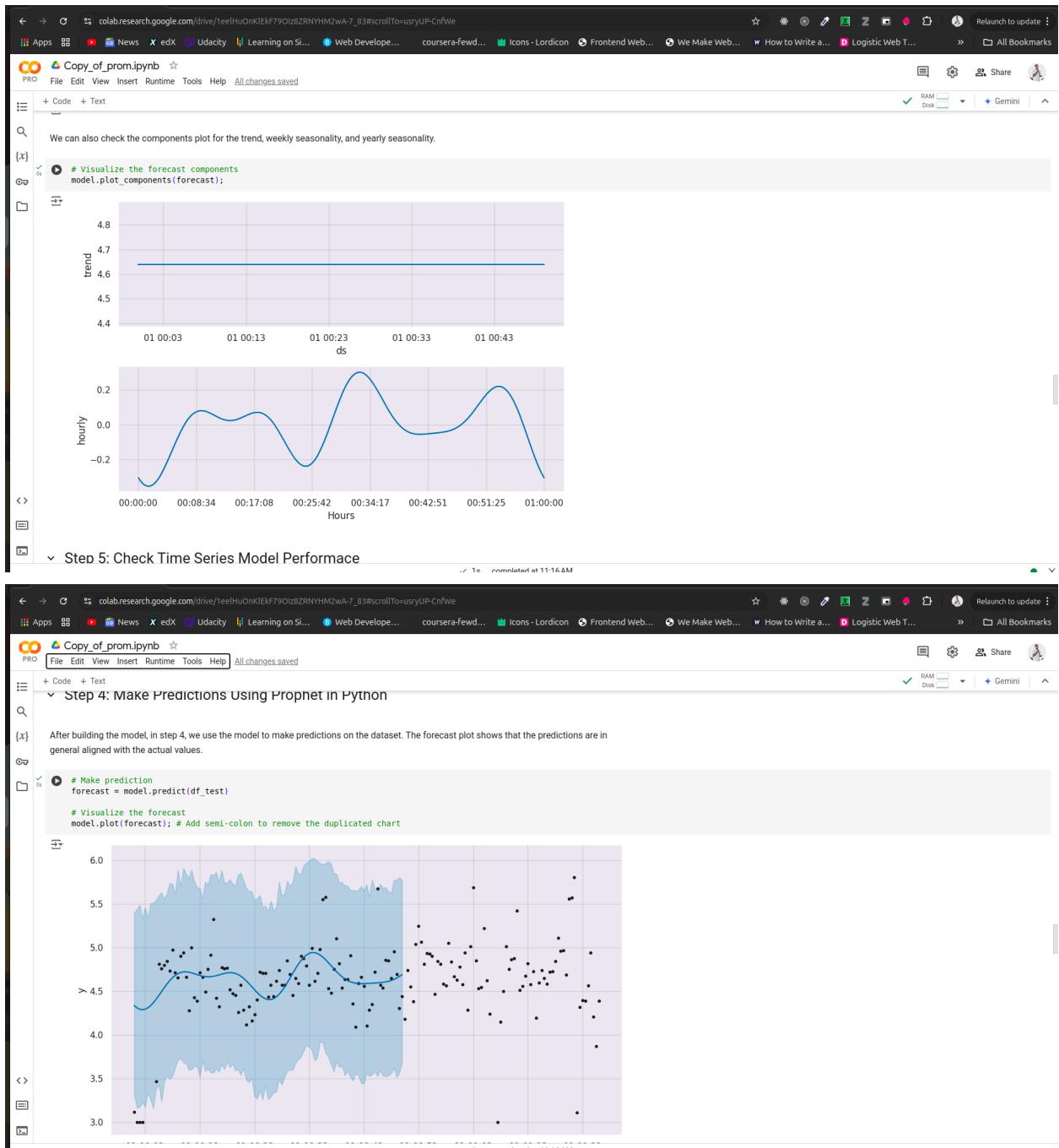
After printing out the anomalies, we can see that all the outliers are lower than the lower bound of the uncertainty interval.

```
[77]: # Take a look at the anomalies
       anomalies = performance[performance['anomaly']==1].sort_values(by='ds')
       anomalies
```

	ds	y	yhat_lower	yhat_upper	anomaly
0	1970-01-01 00:00:00	3.119372	4.335614	3.317880	5.394042
1	1970-01-01 00:00:30	3.000000	4.308790	3.163505	5.437771
2	1970-01-01 00:01:00	3.000000	4.292419	3.173264	5.483288
3	1970-01-01 00:01:30	3.000000	4.287001	3.228771	5.331846
89	1970-01-01 00:44:30	5.676606	4.594779	3.523526	5.636960

Next steps: Generate code with anomalies | View recommended plots | New interactive sheet





Lab Task 3: Console output of a run covering at least one full cycle of test data without faults generated to verify minimal anomaly detection and correct model following of seasonality.

```

monitor
└── monitor_model
    ├── boutique_training.json
    ├── Dockerfile
    ├── monitor-deployment.yaml
    ├── monitor.py
    └── requirements.txt

> PROMETHEUSSANDBOX
> task1
> task2
> task3
> ignore
└── AIOPS-LAB6.pdf
    └── boutique_training.json
        ├── boutique_training.json
        ├── Copy_of_prom.ipynb
        ├── deprovision.sh
        ├── experiment-log.txt
        ├── provision2.sh
        └── README.md

> shippingservice-fault-injection.yaml

```

TERMINAL

```

Monitoring Results:
| Timestamp | Actual | Predicted | Lower Bound | Upper Bound | Anomaly | MAE | MAPE |
|-----|-----|-----|-----|-----|-----|-----|-----|
| 2024-11-26 11:33:25.888359 | 4.729 | 4.292 | 3.212 | 5.384 | 0 | 0.436 | 0.092 |
| 2024-11-26 11:34:26.098900 | 4.685 | 4.293 | 3.213 | 5.329 | 0 | 0.392 | 0.084 |
| 2024-11-26 11:35:26.267736 | 4.972 | 4.334 | 3.379 | 5.399 | 0 | 0.638 | 0.128 |
| 2024-11-26 11:36:26.413634 | 4.875 | 4.406 | 3.343 | 5.545 | 0 | 0.470 | 0.096 |
| 2024-11-26 11:37:26.571987 | 4.800 | 4.494 | 3.309 | 5.534 | 0 | 0.306 | 0.064 |

```

Window Summary:
Total Anomalies: 0
Average MAE: 0.449
Average MAPE: 0.093

```

Monitoring Results:
| Timestamp | Actual | Predicted | Lower Bound | Upper Bound | Anomaly | MAE | MAPE |
|-----|-----|-----|-----|-----|-----|-----|-----|
| 2024-11-26 11:34:26.098900 | 4.605 | 4.293 | 3.213 | 5.329 | 0 | 0.392 | 0.084 |
| 2024-11-26 11:35:26.267736 | 4.972 | 4.334 | 3.379 | 5.399 | 0 | 0.638 | 0.128 |
| 2024-11-26 11:36:26.413634 | 4.875 | 4.406 | 3.343 | 5.545 | 0 | 0.470 | 0.096 |
| 2024-11-26 11:37:26.571987 | 4.800 | 4.494 | 3.309 | 5.534 | 0 | 0.306 | 0.064 |
| 2024-11-26 11:38:26.723022 | 4.804 | 4.583 | 3.468 | 5.728 | 0 | 0.222 | 0.046 |

```

Window Summary:
Total Anomalies: 0
Average MAE: 0.406
Average MAPE: 0.084

```

Monitoring Results:
| Timestamp | Actual | Predicted | Lower Bound | Upper Bound | Anomaly | MAE | MAPE |
|-----|-----|-----|-----|-----|-----|-----|-----|
| 2024-11-26 11:33:25.888359 | 4.729 | 4.292 | 3.212 | 5.384 | 0 | 0.436 | 0.092 |
| 2024-11-26 11:34:26.098900 | 4.685 | 4.293 | 3.213 | 5.329 | 0 | 0.392 | 0.084 |
| 2024-11-26 11:35:26.267736 | 4.972 | 4.334 | 3.379 | 5.399 | 0 | 0.638 | 0.128 |
| 2024-11-26 11:36:26.413634 | 4.875 | 4.406 | 3.343 | 5.545 | 0 | 0.470 | 0.096 |
| 2024-11-26 11:37:26.571987 | 4.800 | 4.494 | 3.309 | 5.534 | 0 | 0.306 | 0.064 |

```

Window Summary:
Total Anomalies: 0
Average MAE: 0.449
Average MAPE: 0.093

Lab Task 4: Run with injected delays. Console output of your run beginning with no delay injection, followed by a period of time where anomalies are detected, and then another time period when the Istio delay is re-moved. (Clearly mark in the output where delays are introduced and removed).

```

monitor
└── monitor_model
    ├── boutique_training.json
    ├── Dockerfile
    ├── monitor-deployment.yaml
    ├── monitor.py
    └── requirements.txt

> PROMETHEUSSANDBOX
> task1
> task2
> task3
> ignore
└── AIOPS-LAB6.pdf
    └── boutique_training.json
        ├── boutique_training.json
        ├── Copy_of_prom.ipynb
        ├── deprovision.sh
        ├── experiment-log.txt
        ├── provision2.sh
        └── README.md

> shippingservice-fault-injection.yaml

```

TERMINAL

```

Monitoring Results:
| Timestamp | Actual | Predicted | Lower Bound | Upper Bound | Anomaly | MAE | MAPE |
|-----|-----|-----|-----|-----|-----|-----|-----|
| 2024-11-26 11:33:25.888359 | 4.729 | 4.292 | 3.212 | 5.384 | 0 | 0.436 | 0.092 |
| 2024-11-26 11:34:26.098900 | 4.685 | 4.293 | 3.213 | 5.329 | 0 | 0.392 | 0.084 |
| 2024-11-26 11:35:26.267736 | 4.972 | 4.334 | 3.379 | 5.399 | 0 | 0.638 | 0.128 |
| 2024-11-26 11:36:26.413634 | 4.875 | 4.406 | 3.343 | 5.545 | 0 | 0.470 | 0.096 |
| 2024-11-26 11:37:26.571987 | 4.800 | 4.494 | 3.309 | 5.534 | 0 | 0.306 | 0.064 |

```

Window Summary:
Total Anomalies: 0
Average MAE: 0.449
Average MAPE: 0.093

PROBLEMS OUTPUT TERMINAL PORTS GITLENS AZURE COMMENTS

> V TERMINAL

```
(myenv) francisberi@beri:~/Desktop/CMU-Africa/Fall2024/aiops/Lab6/Lab5$ kubectl apply -f shippingservice-fault-injection.yaml
virtualservice.networking.istio.io/shippingservice-fault-injection created
(myenv) francisberi@beri:~/Desktop/CMU-Africa/Fall2024/aiops/Lab6/Lab5$
```

bash monitor_model
python loadgenerator
bash
python3 monitor_model

PROBLEMS OUTPUT TERMINAL PORTS GITLENS AZURE COMMENTS

> V TERMINAL

```
2024-11-26 11:43:03.052094 | 4.192 | 4.767 | 3.697 | 5.723 | 0 | 0.515 | 0.123
```

Window Summary:
Total Anomalies: 0
Average MAE: 0.406
Average MAPE: 0.098

PHASE: DELAY INJECTION PHASE - Istio Delay Active
Timestamp: 2024-11-26 11:44:03.190472

Monitoring Results:

Timestamp	Actual	Predicted	Lower Bound	Upper Bound	Anomaly	MAE	MAPE
2024-11-26 11:38:26.723022	4.804	4.583	3.468	5.728	0	0.222	0.046
2024-11-26 11:39:26.899709	4.711	4.654	3.615	5.741	0	0.057	0.012
2024-11-26 11:42:02.931820	3.790	4.720	3.707	5.793	0	0.930	0.245
2024-11-26 11:43:03.052094	4.192	4.767	3.697	5.723	0	0.515	0.123
2024-11-26 11:44:03.269710	1725.599	4.686	3.569	5.808	1	1720.912	0.997

Window Summary:
Total Anomalies: 1
Average MAE: 344.527
Average MAPE: 0.265

Error fetching data: HTTPConnectionPool(host='34.19.125.8', port=9090): Max retries exceeded with url: /api/v1/query?query=histogram_quantile{280.5%2C+sum%2Brate%28istio request duration milliseconds buckets%7Bsource app%3D%27frontend%27%2C+destination app%3D%27shippingservice%27%2C+reporter app%3D%27source%7D%5B1m50s%29%2By+428le%29%29 (Caused by NewConnectionError('<urllib3.connection.HTTPConnection object at 0x7719ce8b5e20>: Failed to establish a new connection: [Errno 113] No route to host'))
Failed to establish a new connection: [Errno 113] No route to host'
Failed to fetch data, retrying in 60 seconds...

Monitoring Results:

Timestamp	Actual	Predicted	Lower Bound	Upper Bound	Anomaly	MAE	MAPE

The image shows two terminal windows in a dark-themed VS Code interface. Both windows are titled 'TERMINAL' and show monitoring results for a dataset.

Terminal 1 (Top):

```

PROBLEMS OUTPUT TERMINAL PORTS GITLENS AZURE COMMENTS
> V TERMINAL
[1] Failed to establish a new connection: [Errno 113] No route to host...
Failed to fetch data, retrying in 60 seconds...

Monitoring Results:
+-----+-----+-----+-----+-----+-----+-----+-----+
| Timestamp | Actual | Predicted | Lower Bound | Upper Bound | Anomaly | MAE | MAPE |
+-----+-----+-----+-----+-----+-----+-----+-----+
| 2024-11-26 11:39:26.899709 | 4.711 | 4.654 | 3.615 | 5.741 | 0 | 0.057 | 0.012 |
| 2024-11-26 11:40:42:02.931820 | 3.790 | 4.720 | 3.707 | 5.793 | 0 | 0.930 | 0.245 |
| 2024-11-26 11:43:03.052094 | 4.192 | 4.707 | 3.697 | 5.723 | 0 | 0.515 | 0.123 |
| 2024-11-26 11:44:03.209710 | 1725.599 | 4.686 | 3.569 | 5.808 | 1 | 1720.912 | 0.997 |
| 2024-11-26 11:46:05.980542 | 1750.000 | 4.664 | 3.535 | 5.798 | 1 | 1745.336 | 0.997 |
+-----+-----+-----+-----+-----+-----+-----+-----+
Window Summary:
Total Anomalies: 2
Average MAE: 693.550
Average MAPE: 0.475

Monitoring Results:
+-----+-----+-----+-----+-----+-----+-----+-----+
| Timestamp | Actual | Predicted | Lower Bound | Upper Bound | Anomaly | MAE | MAPE |
+-----+-----+-----+-----+-----+-----+-----+-----+
| 2024-11-26 11:42:02.931820 | 3.790 | 4.720 | 3.707 | 5.793 | 0 | 0.930 | 0.245 |
| 2024-11-26 11:43:03.052094 | 4.192 | 4.707 | 3.697 | 5.723 | 0 | 0.515 | 0.123 |
| 2024-11-26 11:44:03.209710 | 1725.599 | 4.686 | 3.569 | 5.808 | 1 | 1720.912 | 0.997 |
| 2024-11-26 11:46:05.980542 | 1750.000 | 4.664 | 3.535 | 5.798 | 1 | 1745.336 | 0.997 |
| 2024-11-26 11:47:06.136681 | 1750.000 | 4.672 | 3.606 | 5.737 | 1 | 1745.328 | 0.997 |
+-----+-----+-----+-----+-----+-----+-----+-----+
Window Summary:
Total Anomalies: 3
Average MAE: 1042.604
Average MAPE: 0.672

```

Terminal 2 (Bottom):

```

PROBLEMS OUTPUT TERMINAL PORTS GITLENS AZURE COMMENTS
> V TERMINAL
[1] Average MAPE: 0.475

Monitoring Results:
+-----+-----+-----+-----+-----+-----+-----+-----+
| Timestamp | Actual | Predicted | Lower Bound | Upper Bound | Anomaly | MAE | MAPE |
+-----+-----+-----+-----+-----+-----+-----+-----+
| 2024-11-26 11:42:02.931820 | 3.790 | 4.720 | 3.707 | 5.793 | 0 | 0.930 | 0.245 |
| 2024-11-26 11:43:03.052094 | 4.192 | 4.707 | 3.697 | 5.723 | 0 | 0.515 | 0.123 |
| 2024-11-26 11:44:03.209710 | 1725.599 | 4.686 | 3.569 | 5.808 | 1 | 1720.912 | 0.997 |
| 2024-11-26 11:46:05.980542 | 1750.000 | 4.664 | 3.535 | 5.798 | 1 | 1745.336 | 0.997 |
| 2024-11-26 11:47:06.136681 | 1750.000 | 4.672 | 3.606 | 5.737 | 1 | 1745.328 | 0.997 |
+-----+-----+-----+-----+-----+-----+-----+-----+
Window Summary:
Total Anomalies: 3
Average MAE: 1042.604
Average MAPE: 0.672

Monitoring Results:
+-----+-----+-----+-----+-----+-----+-----+-----+
| Timestamp | Actual | Predicted | Lower Bound | Upper Bound | Anomaly | MAE | MAPE |
+-----+-----+-----+-----+-----+-----+-----+-----+
| 2024-11-26 11:43:03.052094 | 4.192 | 4.707 | 3.697 | 5.723 | 0 | 0.515 | 0.123 |
| 2024-11-26 11:44:03.209710 | 1725.599 | 4.686 | 3.569 | 5.808 | 1 | 1720.912 | 0.997 |
| 2024-11-26 11:46:05.980542 | 1750.000 | 4.664 | 3.535 | 5.798 | 1 | 1745.336 | 0.997 |
| 2024-11-26 11:47:06.136681 | 1750.000 | 4.672 | 3.606 | 5.737 | 1 | 1745.328 | 0.997 |
| 2024-11-26 11:48:06.630938 | 1750.000 | 4.688 | 3.562 | 5.762 | 1 | 1745.312 | 0.997 |
+-----+-----+-----+-----+-----+-----+-----+-----+
Window Summary:
Total Anomalies: 4
Average MAE: 1391.481
Average MAPE: 0.822

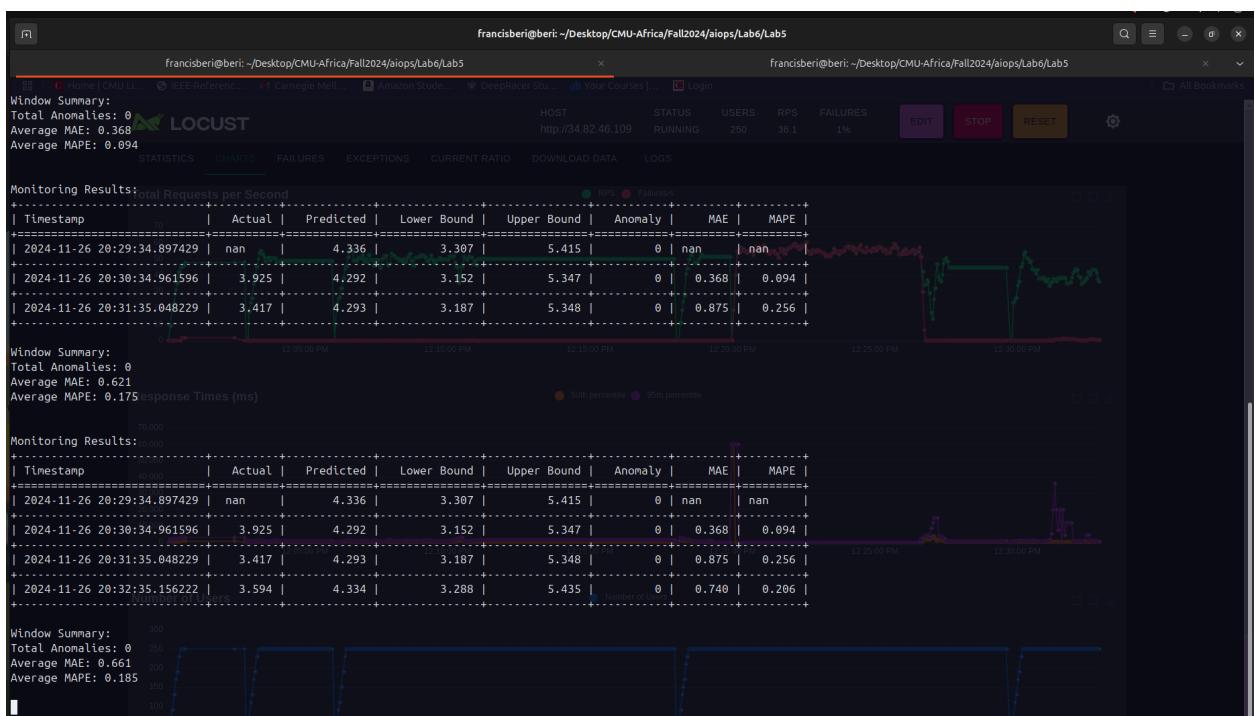
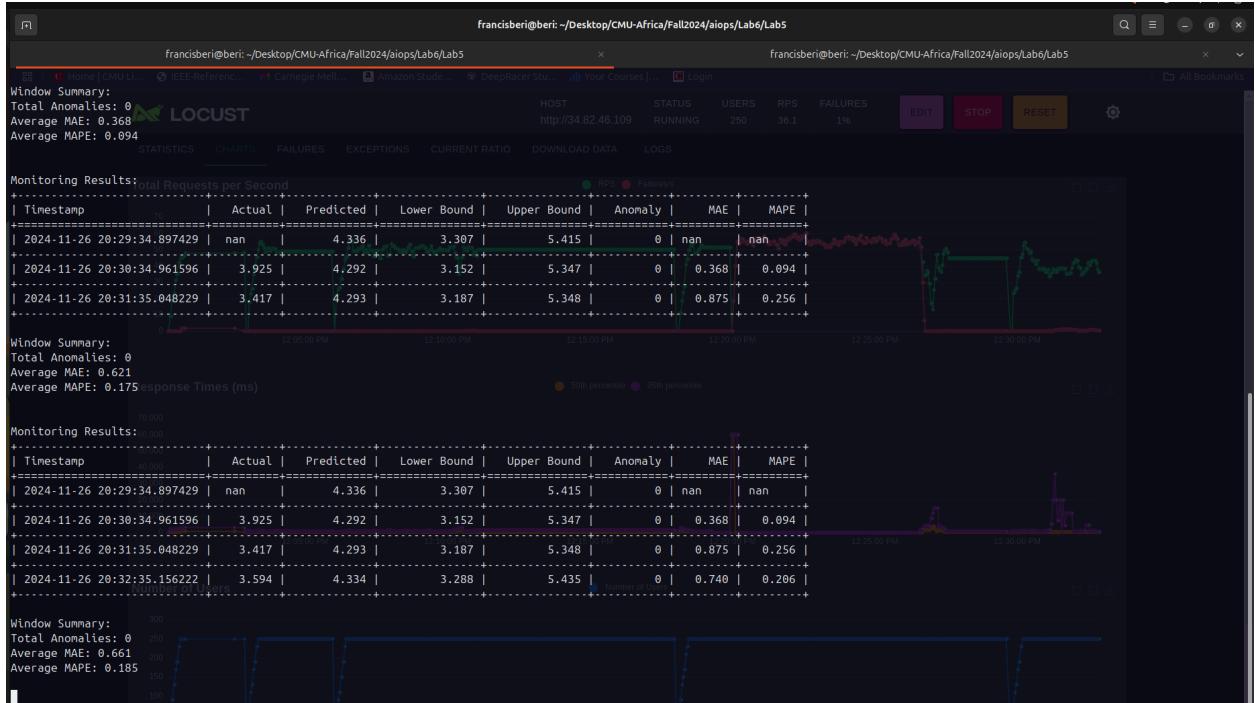
```

Lab Task 5: console output showing running monitor in K8S. Sample console output from your Kubernetes pod showing running monitor

```
francisberi@beri:~/Desktop/CMU-Africa/Fall2024/aiops/Lab6/Lab5$ kubectl scale deployment boutique-monitor --replicas=1
deployment.apps/boutique-monitor scaled
francisberi@beri:~/Desktop/CMU-Africa/Fall2024/aiops/Lab6/Lab5$ kubectl get pods | grep boutique-monitor
boutique-monitor-84d45dc459-46tpc 2/2 Running 0 56s
Container memory usage ⓘ
francisberi@beri:~/Desktop/CMU-Africa/Fall2024/aiops/Lab6/Lab5$ kubectl logs -f boutique-monitor-84d45dc459-46tpc -l app=boutique-monitor
Importing plots failed. Interactive plots will not work.

=====
PHASE: STARTUP - Loading Model
Timestamp: 2024-11-26 20:29:34.698027
=====
Name Container ID Image Port(s) CPU (%) Last started Actions
=====
20:29:34 - cmdstnpy - INFO - Chain [1] start processing 756142944754 prometheussandbox_model<none> - 0% 3 days ago
20:29:34 - cmdstnpy - INFO - Chain [1] done processing 010b572a7e72 wrouesnel/postgres_exporter<none> 9187:9187 0% 21 days ago
=====
PHASE: NORMAL OPERATION - No Delay Injection 3a2c775547a2_grafana 3a2c775547a2 prometheussandbox_grafana<none> 3000:3000 0% 21 days ago
Timestamp: 2024-11-26 20:29:34.848165
=====
Monitor started - waiting for initial data points... 78386809943_prometheus 78386809943 prometheussandbox_prometheus<none> 9090:9090 0% 21 days ago
Monitoring Results: 160dc55ba3a2_app_one 160dc55ba3a2_prometheus<none> 8000:8000 0% 21 days ago
=====
| Timestamp | Actual | Predicted | Lower Bound | Upper Bound | Anomaly | MAE | MAPE |
+-----+-----+-----+-----+-----+-----+-----+-----+
| 2024-11-26 20:29:34.897429 | nan | 4.336 | 3.307 | 5.415 | 0 | nan | nan |
+-----+-----+-----+-----+-----+-----+-----+-----+
5492.5432 ⚡ 0% 3 days ago
=====
Window Summary:
Total Anomalies: 0
Average MAE: nan
Average MAPE: nan

Monitoring Results:
=====
| Timestamp | Actual | Predicted | Lower Bound | Upper Bound | Anomaly | MAE | MAPE |
+-----+-----+-----+-----+-----+-----+-----+-----+
| 2024-11-26 20:29:34.897429 | nan | 4.336 | 3.307 | 5.415 | 0 | nan | nan |
+-----+-----+-----+-----+-----+-----+-----+-----+
| 2024-11-26 20:30:34.961596 | 3.925 | 4.292 | 3.152 | 5.347 | 0 | 0.368 | 0.094 |
+-----+-----+-----+-----+-----+-----+-----+-----+
Showing 10 items
```



Monitoring Results:

Timestamp	Actual	Predicted	Lower Bound	Upper Bound	Anomaly	MAE	MAPE
2024-11-26 20:30:34.961596	3.925	4.292	3.152	5.347	0	0.368	0.094
2024-11-26 20:31:35.048229	3.417	4.293	3.187	5.348	0	0.875	0.256
2024-11-26 20:32:35.156222	3.594	4.334	3.288	5.435	0	0.740	0.206
2024-11-26 20:33:35.227136	3.546	4.406	3.327	5.546	0	0.860	0.242
2024-11-26 20:34:35.355833	3.429	4.494	3.403	5.564	0	1.065	0.311

Window Summary:
 Total Anomalies: 0
 Average MAE: 0.782
 Average MAPE: 0.222
 ⓘ Unenroll From Course

Monitoring Results:

Timestamp	Actual	Predicted	Lower Bound	Upper Bound	Anomaly	MAE	MAPE
2024-11-26 20:31:35.048229	3.417	4.293	3.187	5.348	0	0.875	0.256
2024-11-26 20:32:35.156222	3.594	4.334	3.288	5.435	0	0.740	0.206
2024-11-26 20:33:35.227136	3.546	4.406	3.327	5.546	0	0.860	0.242
2024-11-26 20:34:35.355833	3.429	4.494	3.403	5.564	0	1.065	0.311
2024-11-26 20:35:35.455176	3.465	4.581	3.424	5.621	0	1.116	0.322

Window Summary:
 Total Anomalies: 0
 Average MAE: 0.931
 Average MAPE: 0.267

Homework 4 - Graph-based Prediction Tasks - Code
 0.0 / 0.0
 3 Hours, 45 Minutes Late
 Oct 24 at 12:00AM
 Late Due Date: Nov 14 at 11:59PM

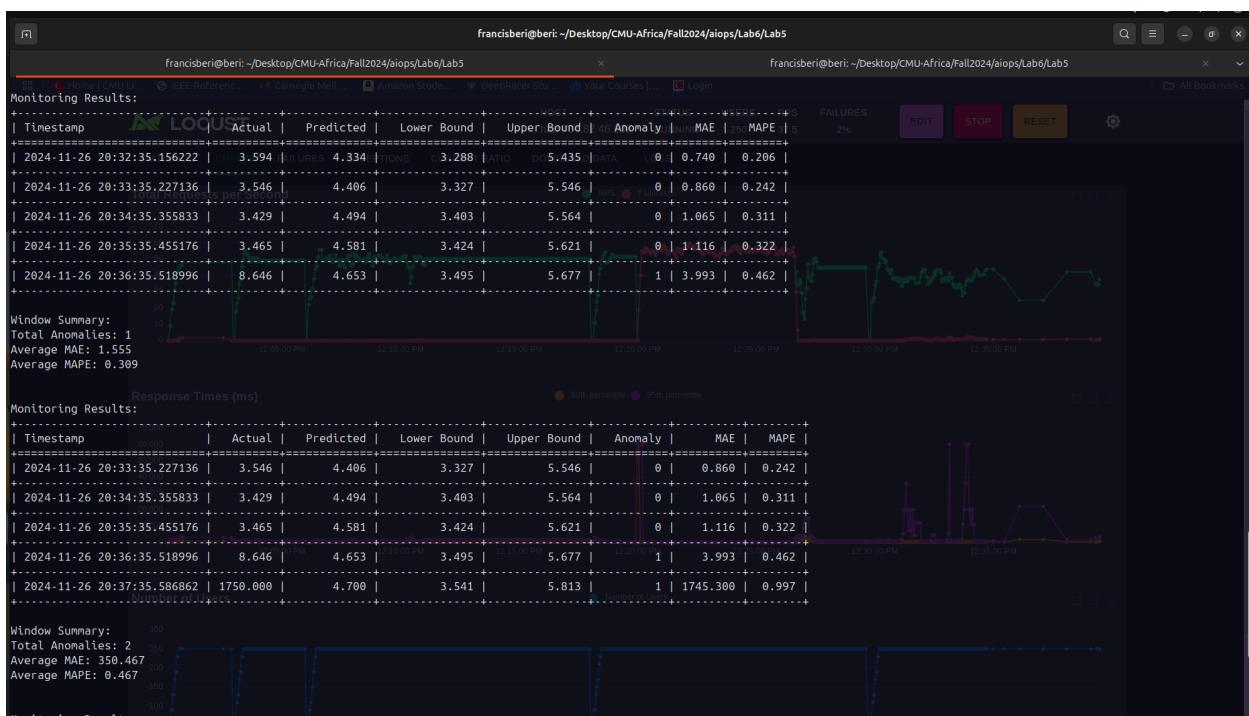
Homework 4 - Graph-based Prediction Tasks - Report
 230.0 / 350.0
 3 Hours, 39 Minutes Late
 Oct 24 at 12:00AM
 Late Due Date: Nov 14 at 11:59PM

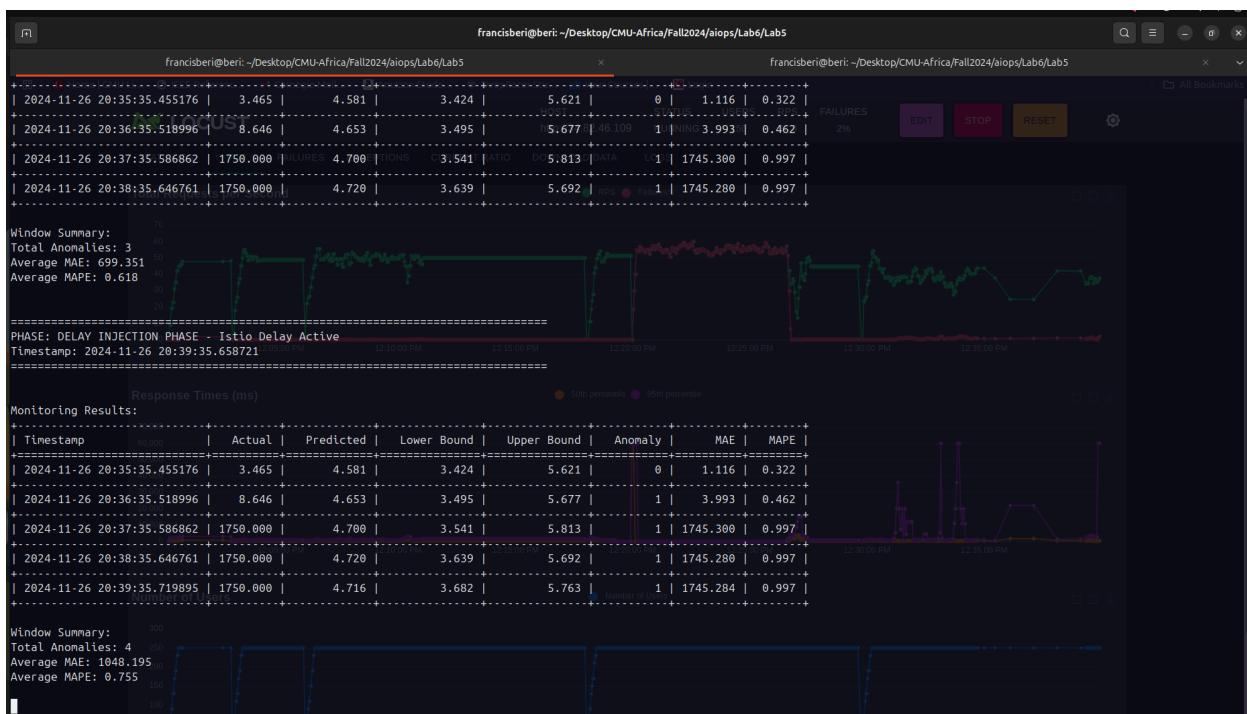
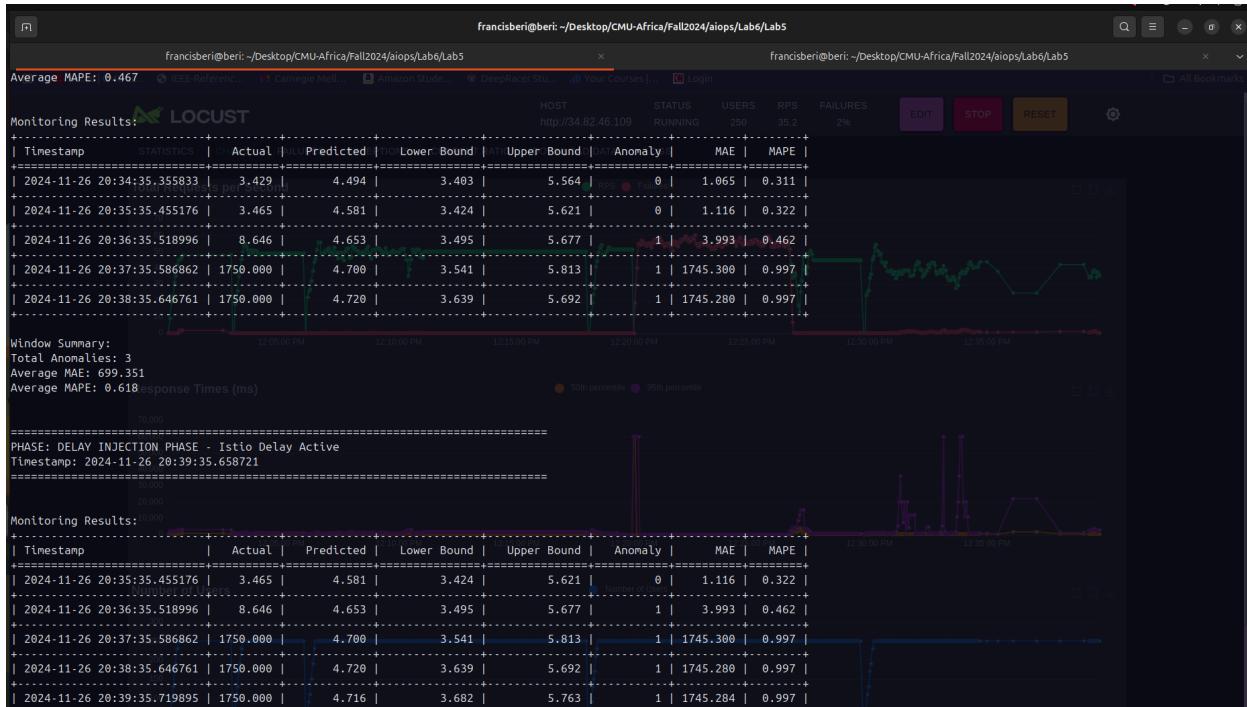
Cheating Form
 1.0 / 1.0
 Aug 26 at 11:00AM
 Oct 27 at 11:00AM

Homework 2 - Softmax with SGD - Report
 3 days, 23 Hours Late
 Sep 19 at 12:00AM
 Oct 03 at 11:59PM
 Late Due Date: Oct 10 at 11:59PM

Homework 1 - RNN & CNN Classifiers - Code
 50.0 / 51.0
 48 Minutes Late
 Sep 05 at 12:00AM
 Sep 19 at 11:59PM
 Late Due Date: Sep 26 at 11:59PM

Homework 1 - RNN & CNN Classifiers - Report
 48.0 / 50.0
 29 Minutes Late
 Sep 05 at 12:00AM
 Sep 19 at 11:59PM
 Late Due Date: Sep 26 at 11:59PM





Lab Task 5: Grafana dashboard: Screenshot of Grafana dashboard showing visualizations listed in Task 5

