

CMPE - 255

Junjie Zhu

Project Document

Project Source Code Link:

- Final Project Folder [\[Google Link\]](#)

Project Track:

- Application

Application Field:

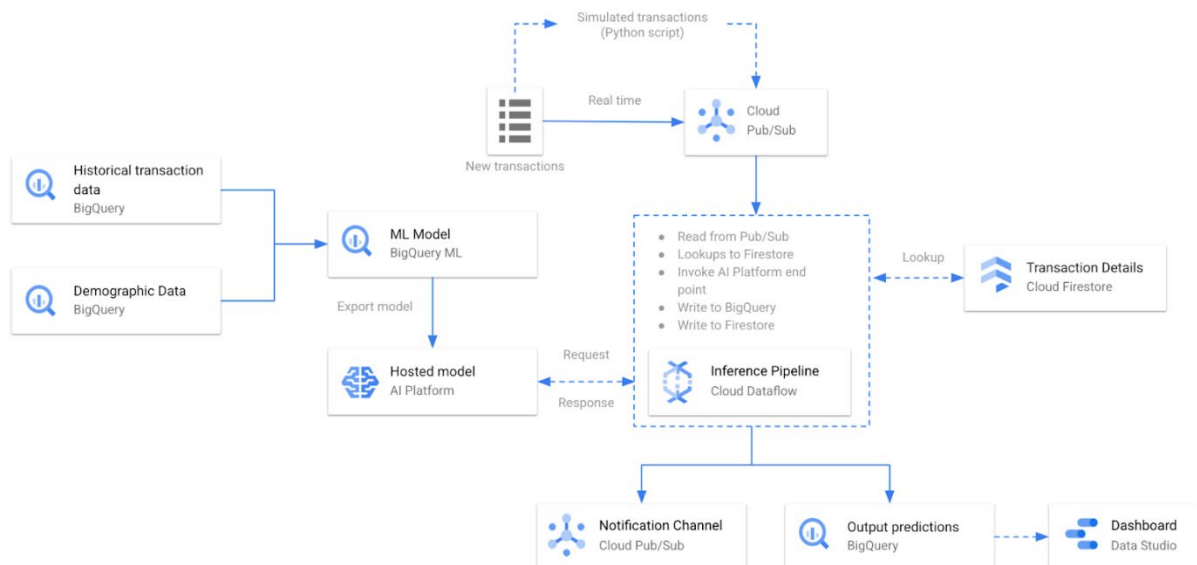
- Serverless Real-Time Credit Card Fraud Detection [\[Reference Google Blog Link\]](#)

Key Techniques:

- Technology Wise:
 - Colab, BigQuery, AI Platform, Cloud Firestore, Pub/Sub, Dataflow,
- Model Wise:
 - Boost Tree Model, Deep Neural Network Model, Random Forest Model
- Concept Wise:
 - Data Mining, Feature Engineering, Cloud Computing, Serverless Computing, Stream Processing, Batch Processing

Overall Architecture:

- Workflow Architecture Diagram:



Application Objective:

- This project aims to predict whether a credit card transaction is fraudulent or not in real time. After the models are trained and deployed, we will use streaming dataflow pipeline to
 - consume incoming transaction details from Cloud Pub/Sub
 - does data preprocessing (by calling Firestore for data enrichment using transaction history)
 - invokes multiple ML models deployed on AI Platform
 - stores the prediction results to BigQuery and
 - sends notification to another Pub/Sub topic when a transaction is predicted fraudulent for downstream consumptions

Utilized Dataset:

- Fake Credit Card Transaction Data Generator [\[GitHub Repo Link\]](#)

Dataset Details:

- BigQuery Tables (for BigQuery model Usage):
 - train_raw - Data used for ML model training
 - test_raw - Data used for ML model evaluation
 - simulation_data - Data to be used for real-time inferences
 - train_with_standard - BQ view providing standard features for training model
 - train_with_aggregates - BQ view providing aggregates features for training model
 - test_with_standard - BQ view providing standard test data for evaluating model
 - test_with_aggregates - BQ view providing aggregates test data for evaluating model
 - demographics - Data comprising customer demographics like name, gender, address
- CSV Tables (for TensorFlow model Usage):
 - train_with_aggregates.csv - Same as above
 - test_with_aggregates.csv - Same as above

About Models:

- For this pattern, we opted for XGBoost (boost tree) model which worked really well while still retaining some level of model explainability. We initially used the boosted tree classifier in BigQuery ML by using standard SQL to train the model and arrive at the probability score for each transaction. Due to the imbalanced nature of the dataset, we used F1 score and AUC to evaluate the performance of the model.
- After the initial evaluation, to boost the performance of the model we derived additional features from the dataset focusing on the frequency of the transactions and the average transaction amount over a period of time.
- As part of the solution, we have used predictions from both the models as part of the pipeline. The model using the standard features gives relatively faster results, the other model uses the features derived from looking at historical data to make the predictions, so it is relatively slow.
- For performance comparison purposes, we trained other model such as BigQuery DNN model and TensorFlow Random Forest model, we will illustrate the performance in the model performance section.

Model Differences:

- Model with standard features: It uses the features which are present in the dataset and doesn't rely on any feature generation techniques.
- Model with aggregate features: Along with the provided features, It uses feature generation techniques to compute transaction frequency, average spend etc. For a given credit card:
 - trans_freq_24 - Number of transactions in the last 24 hours
 - trans_diff - Time difference between current transaction and last transaction in seconds
 - avg_spend_pw - Average transaction amount in the past 1 week
 - avg_spend_pm - Average transaction amount in the past 1 month

Model Performance:

- 1 – Standard XGBoost Model:

Model_1_Standard_BTC:						
5 FROM	BQML_CREDIT_CARD_FRAUD.MODEL_1_EVALUATION					
	precision	recall	accuracy	f1_score	log_loss	roc_auc
0	0.754	0.642	0.996	0.694	0.011	0.994

6	BQML_CREDIT_CARD_FRAUD.MODEL_1_CONFUSION_MATRIX		
	expected_label	predicted_0	predicted_1
0	0	10142	14
1	1	24	43

- 2 – Aggregate XGBoost Model:

Model_2_Aggregate_BTC:						
5 FROM	BQML_CREDIT_CARD_FRAUD.MODEL_2_EVALUATION					
	precision	recall	accuracy	f1_score	log_loss	roc_auc
0	0.929	0.765	0.998	0.839	0.006	0.997

6	BQML_CREDIT_CARD_FRAUD.MODEL_2_CONFUSION_MATRIX		
	expected_label	predicted_0	predicted_1
0	0	10181	4
1	1	16	52

- 3 – Aggregate DNN Model:

Model_3_Aggregate_DNN:						
5 FROM	BQML_CREDIT_CARD_FRAUD.MODEL_3_EVALUATION					
	precision	recall	accuracy	f1_score	log_loss	roc_auc
0	0.833	0.662	0.997	0.738	0.011	0.991

6	BQML_CREDIT_CARD_FRAUD.MODEL_3_CONFUSION_MATRIX		
	expected_label	predicted_0	predicted_1
0	0	10176	9
1	1	23	45

- 4 – Aggregate Random Forest Model:

Model_4_Aggregate_Random_Forest(Tensorflow):	
501/501	[=====
loss:	0.0000
tp:	1402.0000
fp:	80.0000
tn:	497943.0000
fn:	722.0000
accuracy:	0.9984
precision:	0.9460
recall:	0.6601
auc:	0.9792
prc:	0.8568
F1_score: 0.7924	

- Judge by F1 and AUC scores, the model performance in the descending order is as follow:
 - Model 2 > Model 4 > Model 3 > Model 1
- Conclusion:
 - All model works well on identifying the normal transaction but works relatively poor on identifying all fraud transactions from all transactions (low recall)
 - Compared to the standard features, the aggregates features boost the overall model performance, especially precision and recall
 - Without further hyper parameter tuning, Boost Tree Model works the best to the training dataset (where data is unbalanced)

Workflow Screening:

➤ BigQuery

The screenshot shows the Google Cloud Platform BigQuery interface. The table 'train_with_aggregates_table' is displayed with the following columns: Row, day, age, distance, trans_diff, avg_spend_pw, avg_spend_pm, trans_freq_24, category, amt, state, job, unix_time, and city_pop. The table contains 27 rows of data.

Row	day	age	distance	trans_diff	avg_spend_pw	avg_spend_pm	trans_freq_24	category	amt	state	job	unix_time	city_pop
1	6	56	56055.53280189808	999	57.2825	65.905098039215687	2	gas_transport	68.47	OR	Engineer, building services	1559267973	841711
2	1	56	46566.8832992052	380	51.835384615384615	58.762318840579709	2	grocery_pos	94.04	OR	Engineer, building services	1563682172	841711
3	5	56	93266.63606514384	2017	43.374545454545455	62.29703125	0	gas_transport	51.18	OR	Engineer, building services	1567683843	841711
4	7	50	84863.851255988	43	120.01578947368421	97.67329411764706	2	grocery_pos	130.35	MI	Broadcast presenter	1561202032	673342
5	5	50	81650.503699841036	839	71.45666666666666	136.32647887323944	2	travel	4.25	MI	Broadcast presenter	1568933509	673342
6	7	50	42335.384745404561	1171	53.7184	62.559684210526314	1	grocery_pos	83.62	MI	Broadcast presenter	1577506800	673342
7	4	51	68425.7683990311	39	28.42818181818182	60.266666666666666	2	kids_pets	44.6	MI	Broadcast presenter	1587588079	673342
8	2	51	96576.325722669513	4056	36.31	52.262045454545458	0	gas_transport	49.41	MI	Broadcast presenter	1588555992	673342
9	7	39	63117.732105810588	78	70.605714285714291	86.6645	4	grocery_net	50.25	SD	Volunteer coordinator	1549092670	1126
10	6	39	17626.143887996783	1498	76.41266666666667	87.9390410958904	0	personal_care	69.88	SD	Volunteer coordinator	1549644339	1126
11	7	39	48592.188963784305	965	137.65111111111111	107.35269841269842	2	home	72.62	SD	Volunteer coordinator	1550947605	1126
12	4	39	119165.4266639124	717	96.818974338974359	104.50904411764706	4	kids_pets	37.53	SD	Volunteer coordinator	1565801650	1126
13	2	39	56501.931938941059	148	114.08891891891892	103.04711111111111	10	entertainment	71.33	SD	Volunteer coordinator	1575932221	1126
14	1	36	33123.500542112437	252	29.493478260869566	60.435	3	gas_transport	28.74	OK	Research scientist (life sciences)	1551002338	540
15	7	36	9662.7595415451	117	41.128275862068968	72.848091603053433	1	shopping_pos	4.54	OK	Research scientist (life sciences)	1564250253	540
16	1	36	17641.13918791978	69	32.6075	64.027340425531918	2	shopping_pos	8.56	OK	Research scientist (life sciences)	1572214082	540
17	3	37	76875.705961849366	96	45.1744	46.353608247422677	6	grocery_pos	129.94	OK	Research scientist (life sciences)	1586852205	540
18	4	55	116164.75479845241	155	55.652666666666669	80.26666666666667	5	kids_pets	7.78	MD	Clinical research associate	1548285424	11751
19	1	55	112348.84967307691	20	68.921052631578945	67.044754098360656	6	misc_pos	4.42	MD	Clinical research associate	1551601588	11751
20	1	56	47317.132334362723	1196	37.698	52.298461538461538	2	grocery_pos	66.44	MD	Clinical research associate	1581827016	11751
21	2	36	113756.80069575176	1	87.445	75.255692307692314	6	personal_care	2.43	VA	Chartered accountant	1567464643	116155
22	5	36	16476.107825530213	690	56.521	67.185625	3	food_dining	36.49	VA	Chartered accountant	1570715381	116155
23	1	36	108577.94392485167	266	76.318	70.704791666666665	4	food_dining	42.39	VA	Chartered accountant	1577663075	116155
24	2	37	89688.3332930845	659	51.882	82.631315789473689	2	shopping_net	437.33	VA	Chartered accountant	1584965990	116155
25	2	37	60215.279781423284	96	85.242499999999999	94.36559322033898	2	shopping_net	4.37	VA	Chartered accountant	1588008291	116155
26	1	49	93123.9028918476	6068	88.27	50.911764705882355	0	misc_pos	2.34	IL	Restaurant manager, fast food	1583070541	1943
27	2	54	46367.549199651476	284	64.113	59.374338235294118	8	misc_pos	7.97	ID	Cartographer	1563156924	129

➤ AI Platform

The screenshot shows the Google Cloud Platform AI Platform interface. It displays a list of models with columns: Name, Default version, Description, Endpoint, and Labels. The table contains one model entry.

Name	Default version	Description	Endpoint	Labels
AI_MODEL_1	VERSION_2_WITH_AGGREGATES		ml.googleapis.com	

➤ Firestore

The screenshot shows the Google Cloud Platform console for a project named CMPE-255. The Firestore database is in Native mode with a location of us-west1. The breadcrumb path is / > CREDIT_CARD_FRAUD > 0E8lp5SELINvU7WSNoo. The main view displays a collection named CREDIT_CARD_FRAUD with a list of documents. The first document is expanded, showing a field cc_num with the value 36360452125889 and a trans_details array containing 8 elements. Each element in the array has an amt and a trans_date_trans_time.

Document ID	cc_num	trans_details
0E8lp5SELINvU7WSNoo	36360452125889	[{"amt": 54.38, "trans_date_trans_time": "December 19, 2020 at 7:20:38 AM UTC-8"}, {"amt": 88.78, "trans_date_trans_time": "December 19, 2020 at 1:29:44 AM UTC-8"}, {"amt": 88.65, "trans_date_trans_time": "December 18, 2020 at 9:16:07 PM UTC-8"}, {"amt": 7.36, "trans_date_trans_time": "December 18, 2020 at 3:11:21 PM UTC-8"}, {"amt": 38.09, "trans_date_trans_time": "December 18, 2020 at 11:50:42 AM UTC-8"}, {"amt": 14.99, "trans_date_trans_time": "December 18, 2020 at 4:58:16 AM UTC-8"}, {"amt": 71.74, "trans_date_trans_time": "December 18, 2020 at 2:51:55 AM UTC-8"}, {"amt": 71.74, "trans_date_trans_time": "December 18, 2020 at 2:51:55 AM UTC-8"}]

➤ Pub/Sub

The screenshot shows the Google Cloud Platform console for a project named CMPE-255. The Pub/Sub section is active, showing a list of topics and a list of subscriptions. The topics list includes NOTIFICATION-CREDIT-CARD-FRAUD and TOPIC-CREDIT-CARD-FRAUD. The subscriptions list includes ALARM-CREDIT-CARD-FRAUD and SUBSCRIPTION-CREDIT-CARD-FRAUD. The right-hand panel shows a 'Select a topic' dialog with a message 'Please select at least one resource.'

Topic ID	Encryption key	Topic name	Retention
NOTIFICATION-CREDIT-CARD-FRAUD	Google-managed	projects/cmpe-255-342823/topics/NOTIFICATION-CREDIT-CARD-FRAUD	—
TOPIC-CREDIT-CARD-FRAUD	Google-managed	projects/cmpe-255-342823/topics/TOPIC-CREDIT-CARD-FRAUD	—

Subscription ID	Delivery type	Topic name	Ack deadline	Retention	Message ordering	Exactly once del
ALARM-CREDIT-CARD-FRAUD	Pull	projects/cmpe-255-342823/topics/NOTIFICATION-CREDIT-CARD-FRAUD	10 seconds	7 days	Disabled	Disabled
SUBSCRIPTION-CREDIT-CARD-FRAUD	Pull	projects/cmpe-255-342823/topics/TOPIC-CREDIT-CARD-FRAUD	10 seconds	7 days	Disabled	Disabled

➤ DataFlow

The screenshot displays the Google Cloud Platform DataFlow console for a pipeline named "predict-fraudulent-transactions". The pipeline is in a "Running" state. The job graph shows the following steps:

- Read tns from PubSub (Running, 0 sec, 1 stage)
- Convert to JSON (0 elements/s, 0 sec, 1 stage)
- Lookup Historical tns (Running, 6 sec, 1 stage)
- Invoke ML Model (Running, 14 min 2 sec, 1 stage)
- Write pred to BigQuery (Running, 2 sec, 2 stages)
- Filter fraudulent tns (Running, 0 sec, 1 stage)
- Notification... to PubSub (Running, 0 sec, 1 stage)

The right-hand panel shows "Job info" and "Resource metrics".

Job info

Job name	predict-fraudulent-transactions
Job ID	2022-05-13_18_37_41-94823195590/693397
Job type	Streaming
Job status	Running
SDK version	Apache Beam Python 3.7 SDK 2.38.0
Job region	us-west1
Worker location	us-west1-a
Current workers	1
Latest worker status	Worker pool started.
Start time	May 13, 2022 at 6:37:42 PM GMT-7
Elapsed time	5 min 35 sec
Encryption type	Google-managed key

Resource metrics

Current vCPUs	2
Total vCPU time	0.167 vCPU hr
Current memory	7.5 GB
Total memory time	0.625 GB hr
Current HDD PD	30 GB
Total HDD PD time	2.5 GB hr
Current SSD PD	0.8
Total SSD PD time	0.08 hr
Total streaming data processed	95.63 KB

Custom Counters (Approximate)

Counter name	Value	Step
batch_latency.ms_COUNT	10	Write pred to BigQuery.../ParDo(BigQueryWrit
batch_latency.ms_MAX	456	Write pred to BigQuery.../ParDo(BigQueryWrit
batch_latency.ms_MEAN	243	Write pred to BigQuery.../ParDo(BigQueryWrit
batch_latency.ms_MIN	75	Write pred to BigQuery.../ParDo(BigQueryWrit

➤ Batch Processing

Via Terminal RPC:

```
[ ] 1 !gcloud ai-platform predict --model $AI_MODEL_NAME \  
2 --version $VERSION_NAME_WITH_STANDARD \  
3 --region global \  
4 --json-instances sample_inputs/input_w_standard.json
```

Using endpoint [<https://ml.googleapis.com/>]

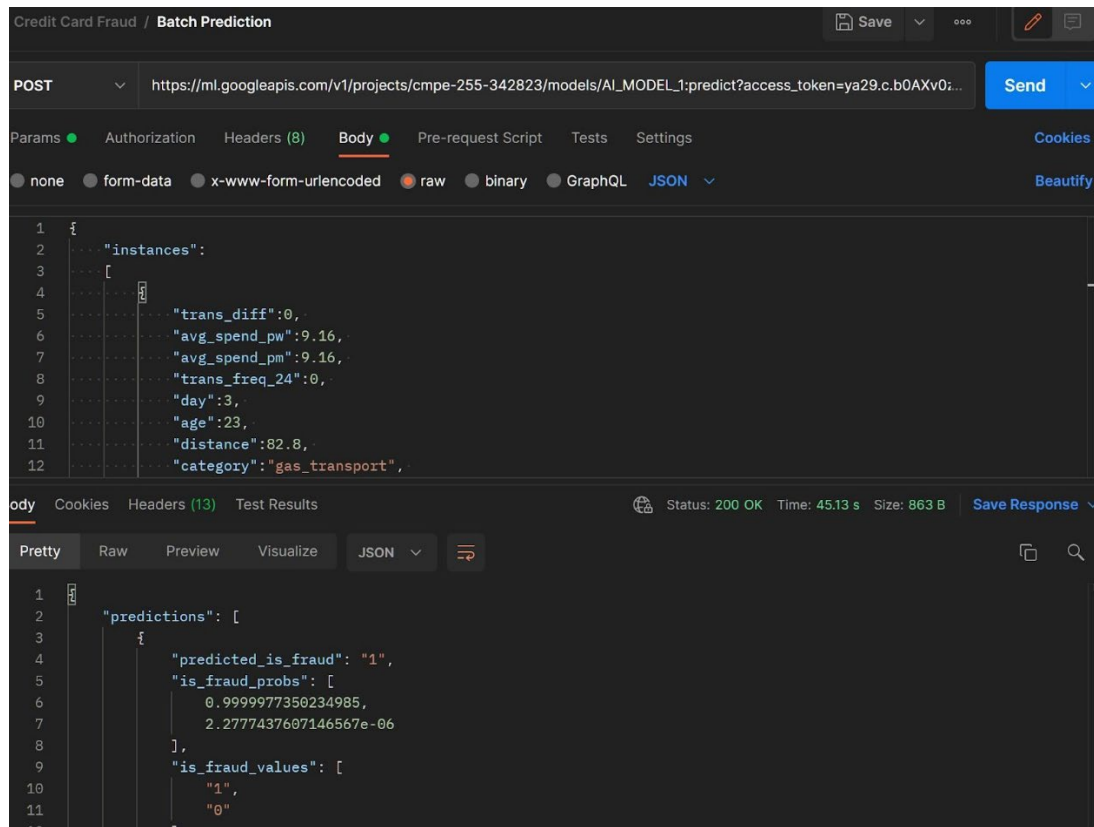
IS_FRAUD_PROBS	IS_FRAUD_VALUES	PREDICTED_IS_FRAUD
[0.9293921589851379, 0.07060789316892624]	['1', '0']	1

```
[ ] 1 !gcloud ai-platform predict --model $AI_MODEL_NAME \  
2 --version $VERSION_NAME_WITH_AGGREGATES \  
3 --region global \  
4 --json-instances sample_inputs/input_w_aggregates.json
```

Using endpoint [<https://ml.googleapis.com/>]

IS_FRAUD_PROBS	IS_FRAUD_VALUES	PREDICTED_IS_FRAUD
[0.9999977350234985, 2.2777437607146567e-06]	['1', '0']	1

Via Postman Rest API:



➤ Stream Processing

Real time transaction table (Before sending transactions to the publisher)

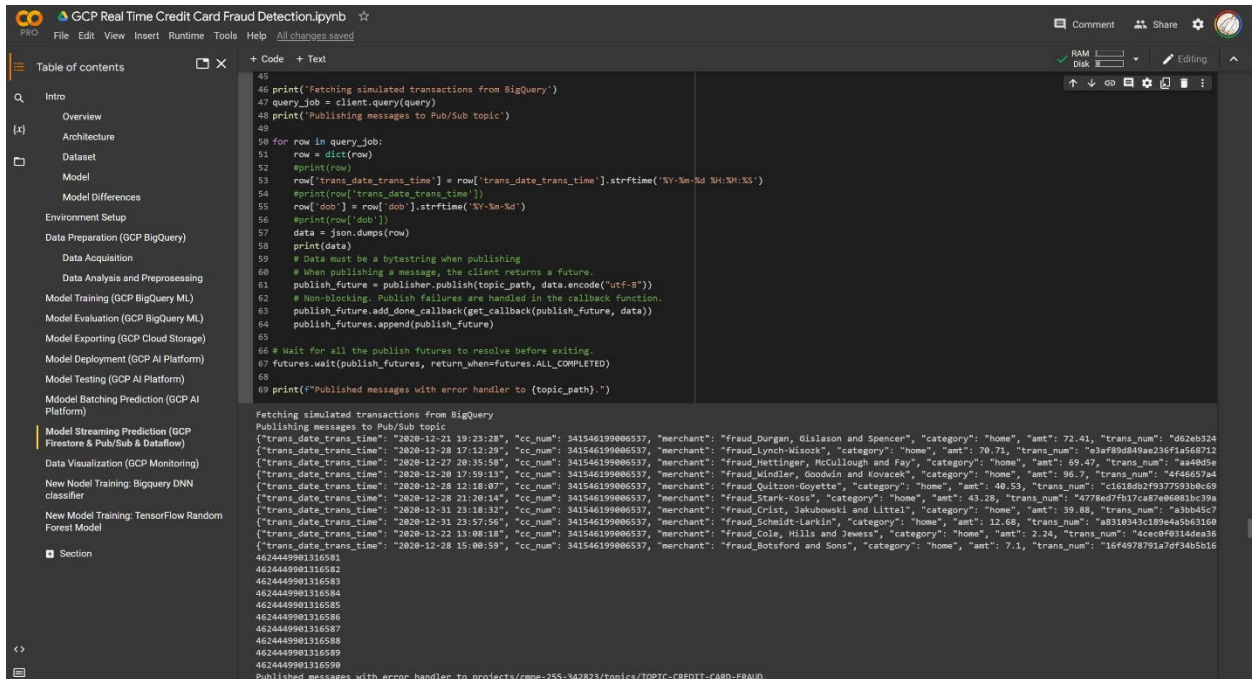
The screenshot shows the Google Cloud Platform console with a BigQuery query and its results. The query is:

```
1 SELECT
2   trans_num, trans_date_trans_time, is_fraud_model_w_aggregates, prob.is_fraud_model_w_aggregates
3 FROM
4   `cmpe-255-342823.BQML_CREDIT_CARD_FRAUD_REAL_TIME_TRANSACTIONS`
5
6
```

The query results are displayed in a table with the following columns: trans_num, trans_date_trans_time, is_fraud_model_w_aggregates, and prob.is_fraud_model_w_aggregates. The table contains 163 rows of data.

Row	trans_num	trans_date_trans_time	is_fraud_model_w_aggregates	prob.is_fraud_model_w_aggregates
151	7c4c48248d1e46ce57d552670e440c	2020-12-20 01:43:43 UTC	0	[0.00048, 0.99952]
152	e6c0364d173f364c3f521ccf0ce11160	2020-12-20 01:44:05 UTC	0	[0.00013, 0.99987]
153	7c4c48248d1e46ce57d552670e440c	2020-12-20 01:43:43 UTC	0	[0.00048, 0.99952]
154	59f1bd3fb0efed2d2d16a93fe03626c	2020-12-20 01:43:01 UTC	0	[0.00026, 0.99974]
155	e6c0364d173f364c3f521ccf0ce11160	2020-12-20 01:44:05 UTC	0	[0.00013, 0.99987]
156	31c9eccc5c6dd39a9a964127c4d9673	2020-12-20 01:43:58 UTC	0	[0.00286, 0.99712]
157	e4c04dfe1aa84d8700acbd8fa70ea80	2020-12-20 01:43:59 UTC	0	[0.01972, 0.98028]
158	14392d723bb7737606b2700ac791b7aa	2020-12-31 23:39:24 UTC	0	[0.00169, 0.99831]
159	6d04313bfe4b6e1b6ca2b6a499a320fe	2020-12-31 23:38:04 UTC	0	[0.00044, 0.99956]
160	bd7071d5e6510a5504ee196368ac30e	2020-12-31 23:38:04 UTC	0	[0.00117, 0.99883]
161	6c5b7c8ad5471975a0f0e023b2e8408	2020-12-31 23:39:15 UTC	0	[0.00093, 0.99907]
162	bd879f7bd9c931682ab0a9d323997b14e	2020-12-20 01:43:56 UTC	0	[0.0001, 0.9999]
163	59f1bd3fb0efed2d2d16a93fe03626c	2020-12-20 01:43:01 UTC	0	[0.00022, 0.99978]

Sending transactions to the publisher (10 transactions per call...to save budget!)



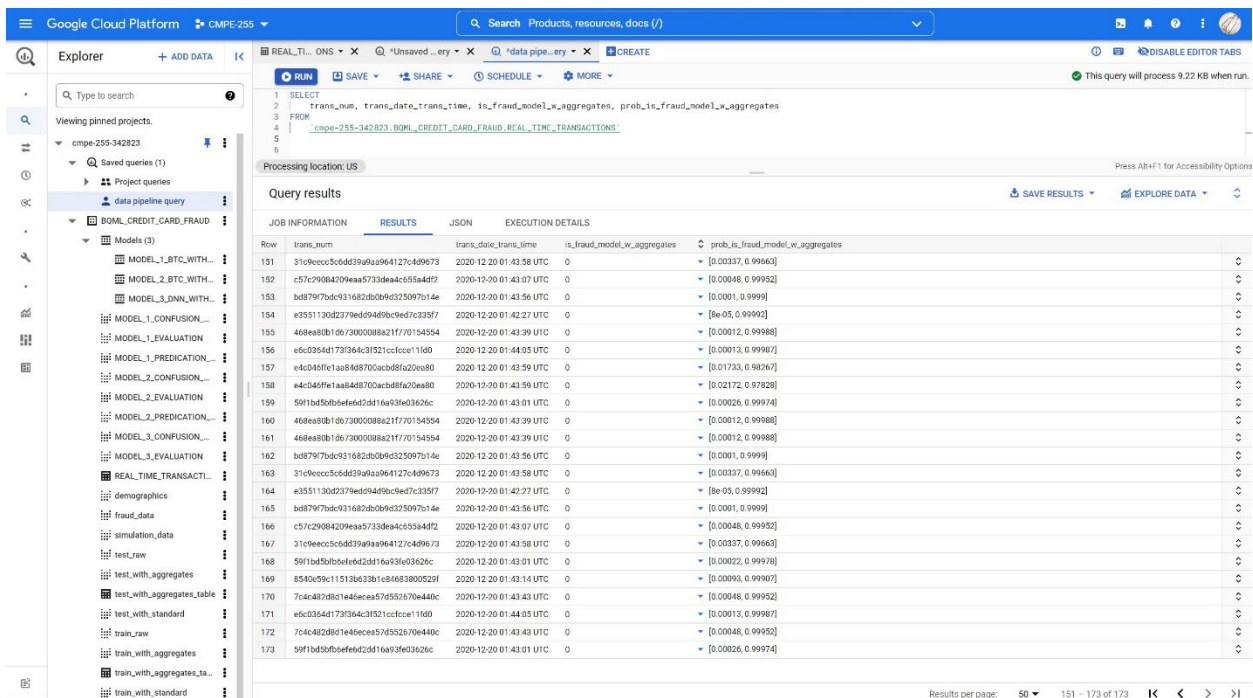
```
46 print('Fetching simulated transactions from BigQuery')
47 query_job = client.query(query)
48 print('Publishing messages to Pub/Sub topic')
49
50 for row in query_job:
51     row = dict(row)
52     #print(row)
53     row['trans_date_trans_time'] = row['trans_date_trans_time'].strftime('%Y-%m-%d %H:%M:%S')
54     #print(row['trans_date_trans_time'])
55     row['dob'] = row['dob'].strftime('%Y-%m-%d')
56     #print(row['dob'])
57     data = json.dumps(row)
58     print(data)
59     # Data must be a bytestring when publishing
60     # When publishing a message, the client returns a future.
61     publish_future = publisher.publish(topic_path, data.encode('utf-8'))
62     # Non-blocking: Publish failures are handled in the callback function.
63     publish_future.add_done_callback(get_callback(publish_future, data))
64     publish_futures.append(publish_future)
65
66 # Wait for all the publish futures to resolve before exiting.
67 futures.wait(publish_futures, return_when=futures.ALL_COMPLETED)
68
69 print(f"Published messages with error handler to {topic_path}.")
```

Fetching simulated transactions from BigQuery

```
{
  "trans_date_trans_time": "2020-12-21 19:23:28",
  "cc_num": "341546199006537",
  "merchant": "Fraud Durgan, Gislason and Spencer",
  "category": "home",
  "amt": 72.41,
  "trans_num": "d62eb324"
},
{
  "trans_date_trans_time": "2020-12-28 17:12:29",
  "cc_num": "341546199006537",
  "merchant": "Fraud Lynch-Wisock",
  "category": "home",
  "amt": 70.71,
  "trans_num": "e3af89d849ee236f1a568712"
},
{
  "trans_date_trans_time": "2020-12-27 20:35:58",
  "cc_num": "341546199006537",
  "merchant": "Fraud Mettinger, McCullough and Fay",
  "category": "home",
  "amt": 69.47,
  "trans_num": "aa48d5e"
},
{
  "trans_date_trans_time": "2020-12-20 17:19:13",
  "cc_num": "341546199006537",
  "merchant": "Fraud Mindler, Goodwin and Kovack",
  "category": "home",
  "amt": 96.7,
  "trans_num": "4d466574"
},
{
  "trans_date_trans_time": "2020-12-28 12:18:07",
  "cc_num": "341546199006537",
  "merchant": "Fraud Dultzon-Goyette",
  "category": "home",
  "amt": 40.53,
  "trans_num": "c1618db2f9377593b0c69"
},
{
  "trans_date_trans_time": "2020-12-28 21:20:14",
  "cc_num": "341546199006537",
  "merchant": "Fraud Stark-Koss",
  "category": "home",
  "amt": 43.28,
  "trans_num": "4778ed7fb17ca87e0681bc39a"
},
{
  "trans_date_trans_time": "2020-12-31 23:18:37",
  "cc_num": "341546199006537",
  "merchant": "Fraud Crist, Jakubowski and Littell",
  "category": "home",
  "amt": 39.88,
  "trans_num": "a3bb45c7"
},
{
  "trans_date_trans_time": "2020-12-31 23:57:56",
  "cc_num": "341546199006537",
  "merchant": "Fraud Schmidt-Larkin",
  "category": "home",
  "amt": 12.66,
  "trans_num": "a8310d343c1b0e485b3168"
},
{
  "trans_date_trans_time": "2020-12-22 13:08:18",
  "cc_num": "341546199006537",
  "merchant": "Fraud Cole, Hills and Jewell",
  "category": "home",
  "amt": 2.24,
  "trans_num": "4ace0f6314dea36"
},
{
  "trans_date_trans_time": "2020-12-28 15:00:59",
  "cc_num": "341546199006537",
  "merchant": "Fraud Botsford and Sons",
  "category": "home",
  "amt": 7.1,
  "trans_num": "16f4978791a7df34b5b16"
}
```

Published messages with error handler to projects/cmpe-255-342823/topics/TOPI-CREDIT-CARD-FRAUD.

Real time transaction table (After sent transactions to the publisher)



Row	trans_num	trans_date_trans_time	is_fraud_model_w_aggregates	prob_is_fraud_model_w_aggregates
151	31c9eccc5c6dd39a9a4127c4d9673	2020-12-20 01:43:58 UTC	0	[0.00337, 0.99663]
152	c57c29084209ea5733dea4c655a4df2	2020-12-20 01:43:07 UTC	0	[0.00048, 0.99952]
153	bd8797bdc931682db09d325097b14e	2020-12-20 01:43:56 UTC	0	[0.0001, 0.9999]
154	a3551130d2379ed94d96c9ed7c339f7	2020-12-20 01:42:27 UTC	0	[0.0005, 0.9995]
155	468ea80b1d673000088e21ff70154354	2020-12-20 01:43:39 UTC	0	[0.00012, 0.99988]
156	c6c0354d173364c31521ccfccc119d	2020-12-20 01:44:05 UTC	0	[0.00013, 0.99987]
157	c4c046f1ca5a848700cbdf620ea80	2020-12-20 01:43:59 UTC	0	[0.01733, 0.98267]
158	e4c046f1ca5a848700cbdf620ea80	2020-12-20 01:43:59 UTC	0	[0.02172, 0.97828]
159	59f1bd50b5efed2d16a3f603626c	2020-12-20 01:43:01 UTC	0	[0.00026, 0.99974]
160	468ea80b1d673000088e21ff70154354	2020-12-20 01:43:39 UTC	0	[0.00012, 0.99988]
161	468ea80b1d673000088e21ff70154354	2020-12-20 01:43:39 UTC	0	[0.0001, 0.9999]
162	bd8797bdc931682db09d325097b14e	2020-12-20 01:43:56 UTC	0	[0.0001, 0.9999]
163	31c9eccc5c6dd39a9a4127c4d9673	2020-12-20 01:43:58 UTC	0	[0.00337, 0.99663]
164	a3551130d2379ed94d96c9ed7c339f7	2020-12-20 01:42:27 UTC	0	[0.0005, 0.9995]
165	bd8797bdc931682db09d325097b14e	2020-12-20 01:43:56 UTC	0	[0.0001, 0.9999]
166	c57c29084209ea5733dea4c655a4df2	2020-12-20 01:43:07 UTC	0	[0.00048, 0.99952]
167	31c9eccc5c6dd39a9a4127c4d9673	2020-12-20 01:43:58 UTC	0	[0.00337, 0.99663]
168	59f1bd50b5efed2d16a3f603626c	2020-12-20 01:43:01 UTC	0	[0.00022, 0.99978]
169	8540c59c11518b633b1e8b63800529f	2020-12-20 01:43:14 UTC	0	[0.00093, 0.99907]
170	70c4828d1e46cees57d552670e440c	2020-12-20 01:43:43 UTC	0	[0.00048, 0.99952]
171	edc0354d173364c31521ccfccc119d	2020-12-20 01:44:05 UTC	0	[0.00013, 0.99987]
172	70c4828d1e46cees57d552670e440c	2020-12-20 01:43:43 UTC	0	[0.00048, 0.99952]
173	59f1bd50b5efed2d16a3f603626c	2020-12-20 01:43:01 UTC	0	[0.00026, 0.99974]

Thank you!