AI on Linux on Z

Fraud detection solution template

This solution template provides an example on how to deploy AI using an Linux on Z environment, while making use of open source frameworks, Triton Inference Server (TIS), and more.

Within this solution template, there are various phases of the AI lifecycle included. Work through each of the following steps to deploy your own fraud detection solution on IBM Z.

IBM

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Step 1

AI model training

We will build a fraud detection AI model by training with the provided rapid AI on Linux on Z development Jupyter notebook. Simply point the Jupyter notebook to your dataset and run it to generate your AI model. This trained AI model can then be deployed with TIS.

All sample code for this section is within

```
ai-st-fraud-detection-tis/zST-model-training-jupyter
```

Prerequisites

1. Must have Python (3.9 or 3.10) installed

Dataset guidance

Sample open source credit card transaction dataset can be found on Kaggle -

https://www.kaggle.com/datasets/ealtman2019/credit-card-transactions

There are several files included within the download. You can use *credit_card_transactions-ibm_v2.csv* for training. Due to the size of the sample dataset, the provided Jupyter notebook takes a subset of the data to decrease the training time. Please modifify the code in the “Fetch and process data” cell of the provided Jupyter notebook later to use more data during training.

Required features

- User (integer) – unique ID for user making transaction
- Card (integer) – unique ID for credit card
- Year (integer) – year of the transaction
- Month (integer) – month of the transaction
- Day (integer) – day of the month of the transaction
- Time (integer) - time of the transaction (HH:MM)
- Amount (float) – dollar amount of the transaction
- Use Chip (string) – the type of transaction (swipe transaction, etc)
- Merchant Name (integer) – unique ID for merchant name
- Zip (integer) – zip code of the transaction

Access rapid AI on Linux on Z development environment

Provide data

Model training

Access trained AI model

Access rapid AI on Linux on Z development environment

1. Create and activate Python virtual environment

```
python -m venv env
source env/bin/activate
```

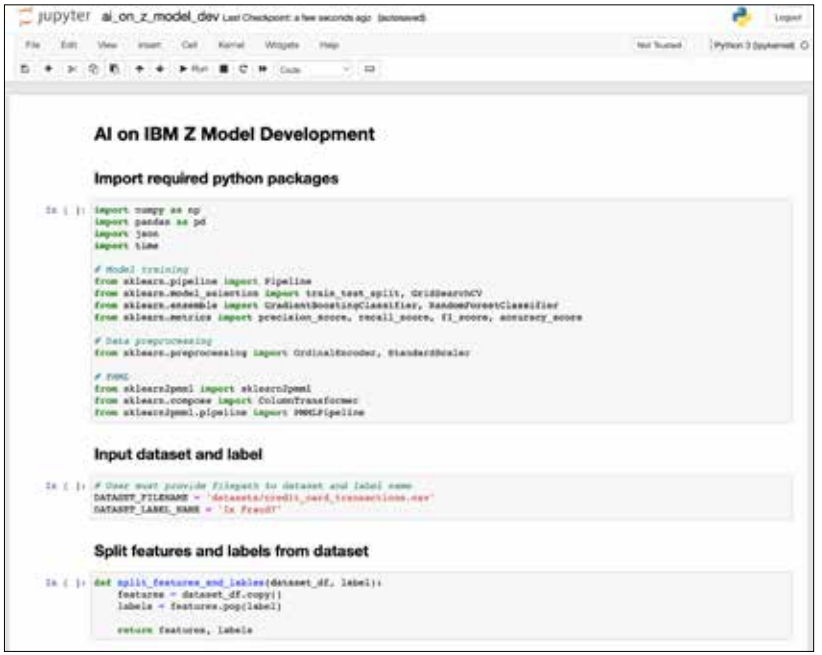
2. Install required Python packages

```
pip install -r requirements.txt
```

3. Run Jupyter

```
jupyter notebook
```

4. View Jupyter interface
   Go to localhost:8888 in a web browser



Provide data

1. Add your input dataset (csv) into datasets/ directory
2. Add input data to Jupyter notebook
   - Set DATASET_FILENAME to the path to your dataset
   - Set DATASET_LABEL_NAME to the name of the column you're predicting from the dataset

Access rapid AI on Linux on Z development environment

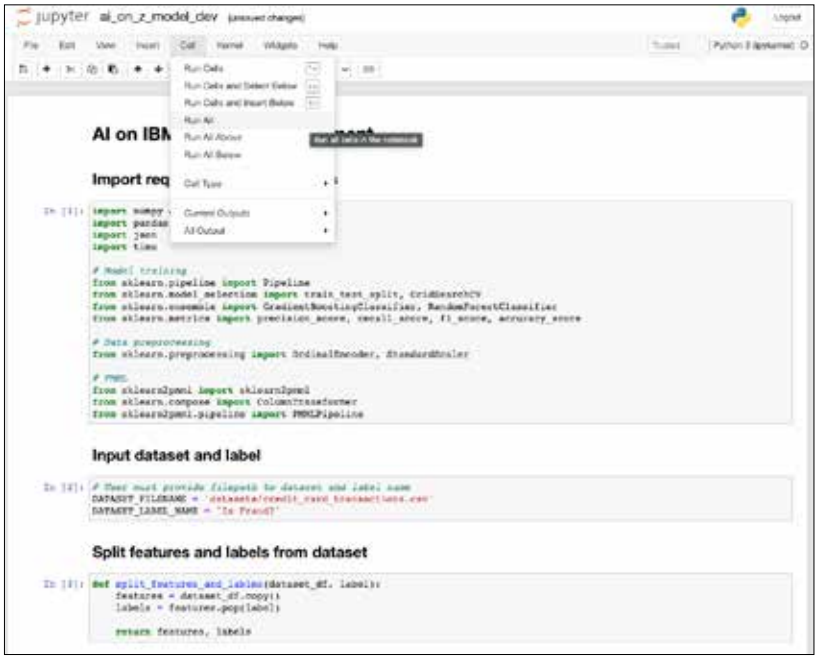
Provide data

Model training

Access trained AI model

Model training

1. Step through and run Jupyter notebook from web browser



Access trained AI model

1. Once training is complete, you can find your AI models within the models/directory (choose one for the following AI model deployment step)

AI model training complete

Step 2

AI model deployment

We will deploy our fraud detection AI model using TIS. We can utilize the AI Toolkit to leverage TIS for model deployment. This deployed AI model can then be integrated into applications within the Linux on Z environment.

Prerequisites

1. Must have Docker or Podman installed

Build Triton Inference Server

Integrate AI model into Triton Inference Server

Deploy Triton Inference Server

Run sample test

Build Triton inference server

1. Build docker image

```
docker build -t zst-tis .
```

Integrate AI model into Triton Inference Server

1. Add your model (.pmml file) to

```
ai-st-fraud-detection-tis/zST-model-deployment/zST/models
```

   directory

2. Add your preprocessing .joblib file to

```
ai-st-fraud-detection-tis/zST-model-deployment/zST/models
```

   directory

Deploy Triton inference server

1. Create docker network

```
docker network create my-data-network
```

Build Triton Inference Server

Integrate AI model into Triton Inference Server

Deploy Triton Inference Server

Run sample test

2. Run docker container

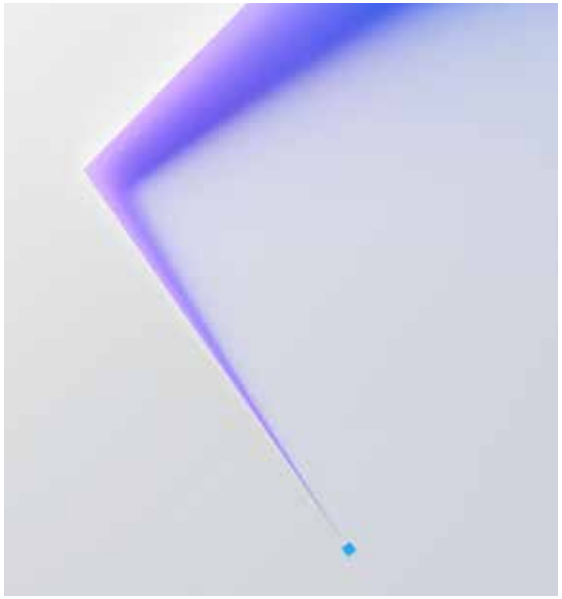
```
docker run --net=my-data-network --
shm-size 1G -u root --rm -p8000:8000
-v//$PWD/zST/models:/models zst-tis
tritonserver --model-repository=/models
```

Run sample test

1. Run python script from terminal with ip/port of triton inference server

```
cd zST
python inference_request.py
```

AI model deployment complete



Step 3

AI model analysis

We will analyze our fraud detection AI model using a sample AI on Linux on Z Fraud Detection Dashboard. We can invoke the API of this sample dashboard from another sample application to visualize the AI model inferencing.

All sample code for this section is within

```
ai-st-fraud-detection-tis/zST-model-analysis
```

Prerequisites

1. Must have TIS installed
2. Must have Python installed
3. Must have Git installed
4. Must have Docker or Podman installed

Configure sample application
Build sample application
Deploy sample application
Access sample application
Analyze credit card events
Make predication

Configure sample application

1. Set the enrionment variables within

```
ai-st-fraud-detection-tis/zST-model-
analysis/env.list
```

   - TIS_ENDPOINT (scoring endpoint for triton)

Build sample application

1. Run command in terminal

```
docker build -t model-analysis
```

Deploy sample application

1. Run command in terminal (e.g. port 5002)

```
docker run --net=my-data-network --rm -
p 5002:5002 --env-file env.list --name
model-analysis-app model-analysis
```

Configure sample application
Build sample application
Deploy sample application
Access sample application
Analyze credit card events
Make predication

Access sample application

1. View the following URL in a web browser
   http://{ip address}:{port}
   - IP address: IP of server you deployed application in
   - Port: port you used with Docker run

Analyze credit card events

1. Go to sample insights dashboard in web browser
   http://{ip address}:{port}
2. Go to latest predictions tab

Configure sample application
Build sample application
Deploy sample application
Access sample application
Analyze credit card events
Make predication

Make predication

1. Go to sample insights dashboard in web browser http://{ip address}:{port}
2. Go to latest make predication tab
3. Input json data
4. Click submit

AI model analysis complete

Step 4

AI model integration

We can use our deployed TIS fraud detection AI model and integrate it into different types of applications. The AI model can be analyzed and/or provide inferencing APIs using a the sample AI on Linux on Z Fraud Detection Dashboard.

All sample code for this section is within

```
ai-st-fraud-detection-tis/zST-storefront-evershop
```

Prerequisuties

1. Must have AI on IBM Z Sample Fraud Detection Dashboard deployed for inferencing and analysis
2. Must have Docker installed

Install and deploy sample ecommerce application
Configure sample ecommerce application
Access admin panel from web browser
Add products
Configure store settings
Configure payment settings
Configure shipping settings
Access sampe ecommerce application
Use fraud detection AI model with EverShop Storefront

Install and deploy sample ecommerce application

1. Set app_url_w_port variable in CheckoutForm.jsx to your server IP and port (ip:port)

```
ai-st-fraud-detection-tis/zST-storefront-evershop/packages/evershop/src/components/frontStore/stripe/checkout/CheckoutForm.jsx
```

2. Run command in terminal

```
docker-compose up
```

Configure sample ecommerce application

Access admin panel from web browser

1. Enter URL in web browser using app url (e.g. localhost)

```
http://localhost:3000/admin
```

2. Login with default admin credentials
   - Email: admin@test.com
   - Password: password

Install and deploy sample ecommerce application

Configure sample ecommerce application

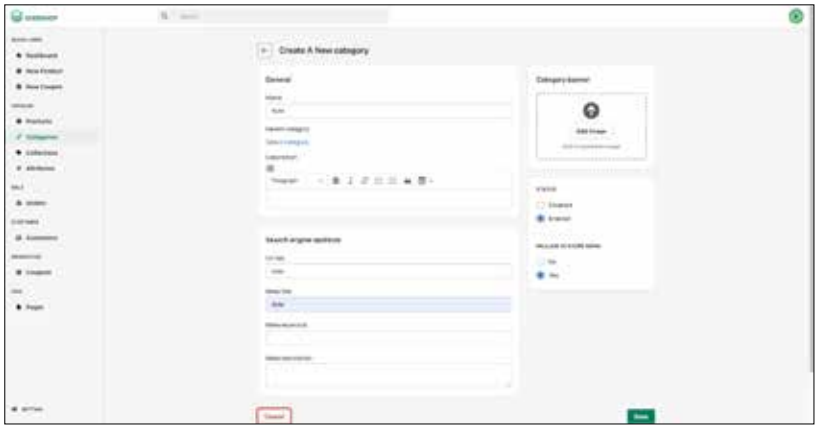
- Access admin panel from web browser
- Add products
- Configure store settings
- Configure payment settings
- Configure shipping settings

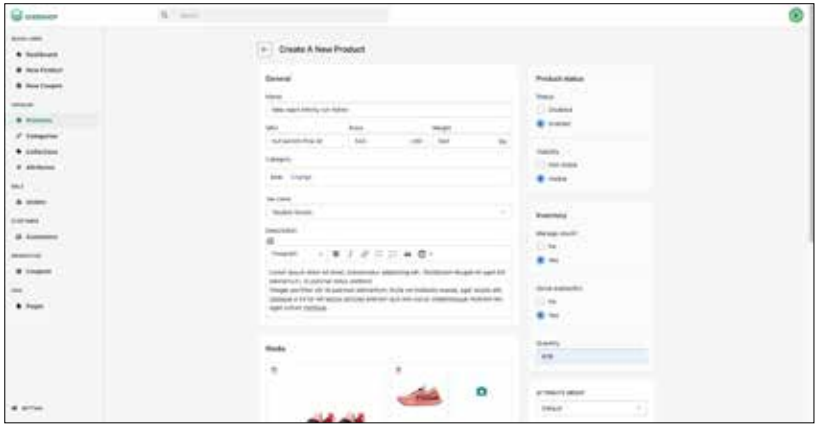
Access sampe ecommerce application

Use fraud detection AI model with EverShop Storefront

Add products

1. Create categories
   - Click categories from the catalog section
   - Click new category
   - Add category details
     - Add name (e.g. Kids)
     - Add url key
     - Add meta title
     - Change status to enabled
     - Change include in store menu to yes
   - Click save
2. Add products
   - Click products from the catalog section
   - Click new product
   - Add category details
     - Make sure to change add category
     - Make sure to change status to enabled
     - Make sure to change visibility to visible





Install and deploy sample ecommerce application

Configure sample ecommerce application

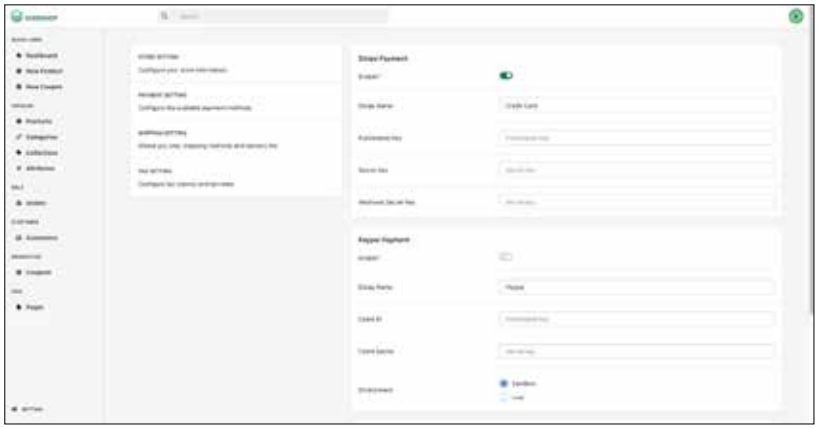
- Access admin panel from web browser
- Add products
- Configure store settings
- Configure payment settings
- Configure shipping settings

Access sampe ecommerce application

Use fraud detection AI model with EverShop Storefront

Configure store settings

1. Enter URL in web browser using app url (e.g. localhost)
2. Click settings on the bottom left
3. Click store setting

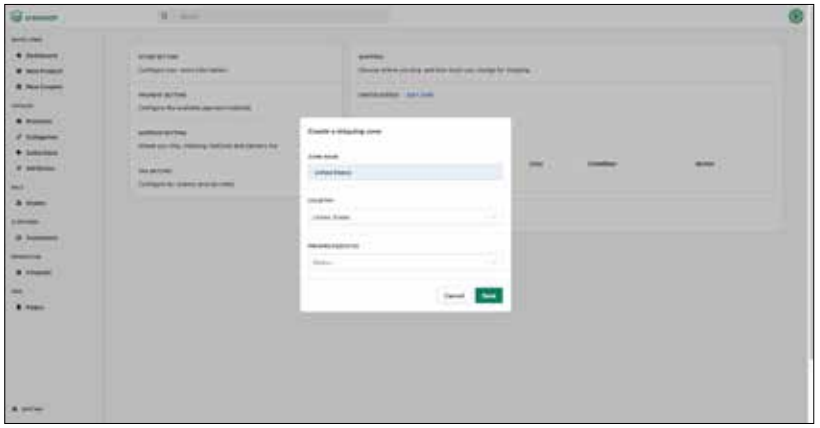


Configure payment settings

1. Click payment setting
2. Enable stripe payment
3. Click save

Configure shipping settings

1. Click shipping setting
2. Add shipping zone
   - Click create new shipping zone
   - Add shipping details
3. Click save



Install and deploy sample ecommerce application

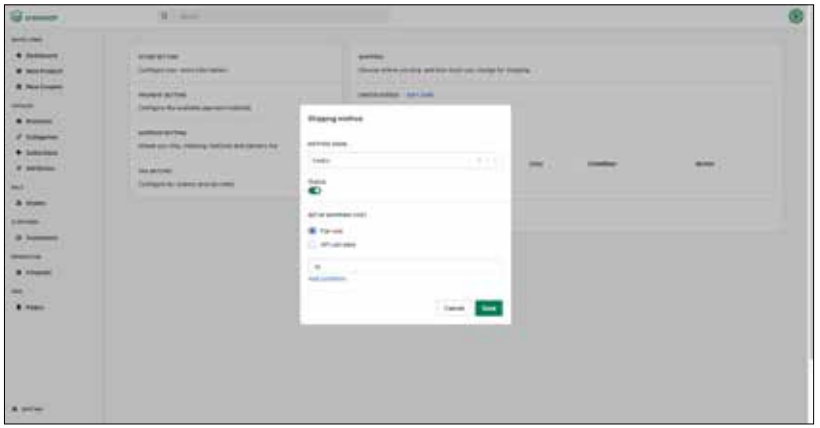
Configure sample ecommerce application

- Access admin panel from web browser
- Add products
- Configure store settings
- Configure payment settings
- Configure shipping settings

Access sampe ecommerce application

Use fraud detection AI model with EverShop Storefront

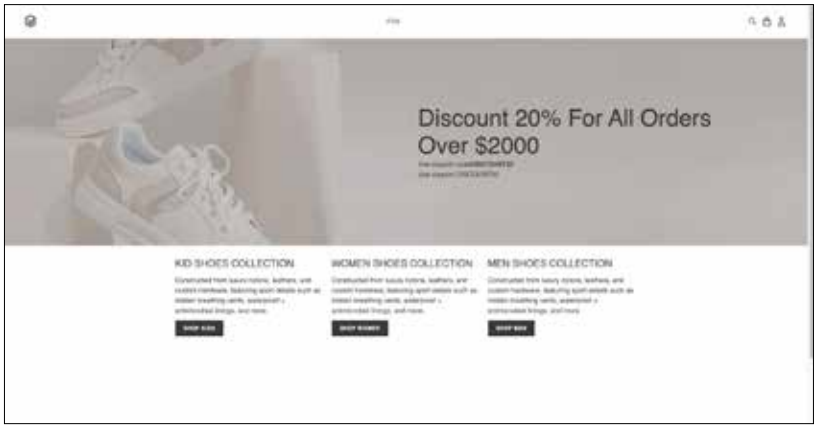
2. Add payment method
    - Click add method
    - Add method name (e.g. FedEx)
    - Enable status
    - Add flat rate (e.g. 10)
    - Click save



Access sampe ecommerce application

1. Enter URL in web browser using app url (e.g. localhost)

```
http://localhost:3000
```



Install and deploy sample ecommerce application

Configure sample ecommerce application

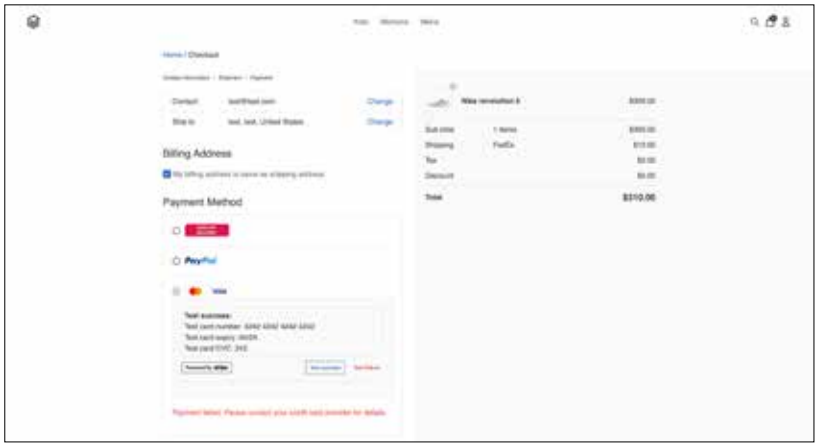
- Access admin panel from web browser
- Add products
- Configure store settings
- Configure payment settings
- Configure shipping settings

Access sampe ecommerce application

Use fraud detection AI model with EverShop Storefront

Use fraud detection AI model with EverShop Storefront

1. Make sure you have AI on Linux on Z Sample Fraud Detection Dashboard deployed for inferencing and analysis on the same local system
2. AI on Linux on Z Sample Fraud Detection Dashboard is configured to invoke TIS AI model
3. Add items to cart
4. Place order
   - Choose test failure as payment method for fraud transaction example
   - Choose test success as payment method for non fraud transaction example



AI model integration complete