FRAUD/ FINANCIAL CRIME PREVENTION SOLUTIONS FOR BANKS(CREDIT CARD) WITH REINFORCEMENT LEARNING

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In my use case, I need to resolve an entity (personal or corporate name) that has encountered credit card transaction .

Since the KYC data cannot be obtained, there is not much data (account number, customer number, etc.) and it depends on the name and address of the party.

Goal is to find accuracy, f1 score, precision, sensitivity, specificity . for the following modeles

*K-NN

*Decision tree

*SVM

Later we are going to use reinforcement learning to improve the model and improve it.

Solution Design

ML model used (K-NN, SVM, Decision tree, DQN)
Metrics – Confusion matrix,Mean reward per thousand episodes

Data(Train) – 85%
Data(Test) - 15%

- **Data download**
- **Data Analysis**
- **Pre-processing**
- **Model training**
- **Validation**

Implementation

*__Data__ : https://raw.githubusercontent.com/MLWave/Black-Boxxy/master/credit-card-default.csv

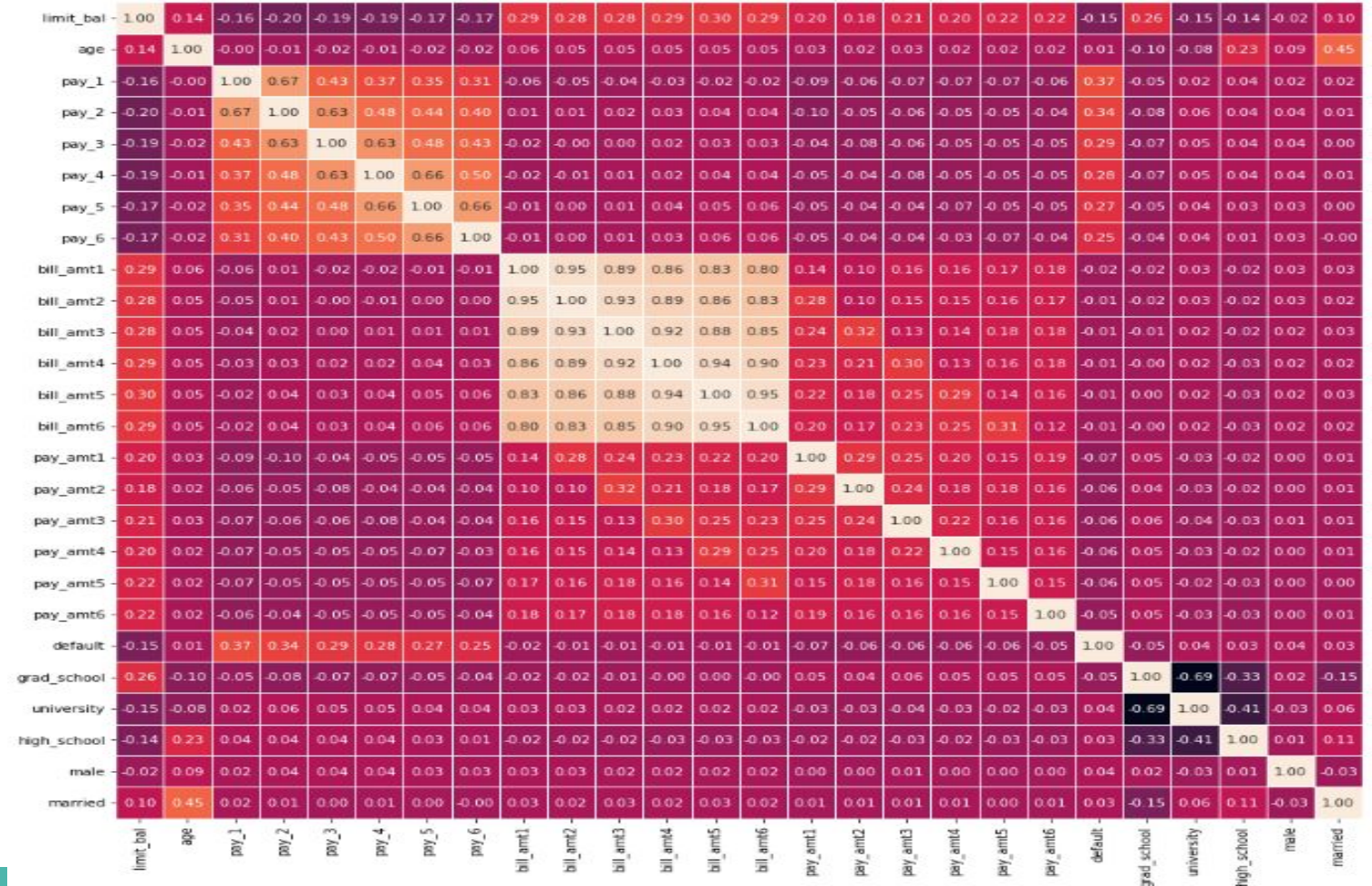
***Data Analysis :** Check Null values & correlation.

***Pre-processing :** Train/Test splits , use robust scaler for standardization.

***Model training :** K-NN, SVM, Decision tree, DQN.

***Validation :** Confusion matrix (accuracy, f1 score, precision, sensitivity, specificity),Mean reward per thousand episodes (RL).

Pre-processing : Correlation



Q-Learning Model Algorithm

Training data D = (x1,p1),(x2,p2),.....,(xn,pn)

Number Of Samples N

Memory M , Capacity N

Activation Function Q

Random Weights as W

y(i)=r(i)+ymaxQ(s(i)+1,a';W)

L(w)=(y(i)-Q(s(i),a(i);W)^2)

THE Q TABLE I IMPLEMENTED:

Q_table[current_state, action] = (1-lr) * Q_table[current_state, action] +lr*(reward +gamma*max(Q_table[next_state,:]))

total_episode_reward = total_episode_reward + reward

Performance -1

	Accuracy	F-1 Score	Precision	Sensitivity	Specificity
Decision Tree	0.722667	0.395349	0.381665	0.811412	0.41005
SVM	0.795111	0.395349	0.551773	0.909843	0.390955
k-nn	0.781111	0.395335	0.507886	0.910984	0.323618

Performance - 2

Mean reward per thousand episodes

1000 mean espiode reward: 0.052

2000 mean espiode reward: 0.218

3000 mean espiode reward: 0.435

4000 mean espiode reward: 0.602

5000 mean espiode reward: 0.665

6000 mean espiode reward: 0.684

7000 mean espiode reward: 0.667

8000 mean espiode reward: 0.677

9000 mean espiode reward: 0.701

10000 mean espiode reward: 0.683

Deliverables

1. We are going to submit our model using jupyter notebook

THANK YOU