University of the West of Scotland

School of Computing, Engineering and Physical Sciences

MSc Project Specification

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MSc Programme/stream: MSC IT

MSc Programme Leader: Dr. Costas Iliopoulos

Project Title:

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| A Python-based Logistic regression model to improve credit card fraud detection using a machine learning algorithm. |

Research Question to be answered:

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| How Python-based Logistic regression algorithm works to detect fraudulent credit card based on different features? |

Outline (overview) and overall aim of project:

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| * Nowadays, most of transactions are done with online payments, and in doing so person’s credit card details are stored online though it is not safe due to the hacking system. As a result, credit card holder’s details are hacked, and fraudulent transactions are done by another person without the permission of credit card owners. It is a very ethical issue in this era, so it is necessary to mitigate this issue. * It is essential to find out about anomalies in the system for some companies’ transactions with the use of credit cards. In today’s digitalization world, most credit card frauds doing online, and therefore it will be imperative to solve this issue and get safe as well as a trustable transaction for every person. * The major aim of this project is to build a credit card fraud detection model, which tells if the transactions made by a credit card are legitimate or fraudulent. Therefore, it is basically based on transaction and their labels as fraud or non-fraud detection processes if the new transaction made by the customer is fraud or not. Additionally, this research project gives two outputs such as which one is a true transaction, and which one is fraud. The model detects approximately 95% of accurate results and improves the quality of the result. * According to the existing literature reviews logistic regression model provides an accurate 95% result to show what is a fraud transaction and what is a real transaction. On top of that, the Logistic regression model very fast detects legitimate and fraudulent credit cards rather than other models. Moreover, this model is improving the visualization as well as the normalization process easy than other models or other algorithms. |

Objectives (list of tasks to be undertaken to achieve overall aim of the project and to answer the research question posed):

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| This research will be based on a python machine-learning algorithm by Logistic regression model. It will depend on the data sets provided that will be provided as secondary data sets. This research will investigate or recognize normal and fraudulent transactions.   1. This research will first collect the data sets from Kaggle and import them into Anaconda API in the Jupyter platform. Additionally, to perform datasets will use the CSV file, which is 143 MB data size. Furthermore, this project must employ Python as a computer language and it is a scripting language that is simple to use, interpreted, object-oriented programming, and a high-level language. 2. After this process will need to install libraries as it’s a member of Python libraries and the most common jobs are multi-dimensional groups. Add to this, it will use for information collecting and modification. 3. Secondly, after library installation, will need to perform explanatory data analysis on the dataset. This process cleans the data and makes it ready to train the model. It will help to balance the data from the imbalanced dataset. 4. Then, will separate the normal and fraud transaction and analyze and visualize the fraud and normal data. And then this data will be divided into portions such as the training phase and testing phase. After this, data will be split into features and labels. 5. Thirdly, need to create a Logistic regression model using a machine learning algorithm. After fitting data into the model will perform a model evaluation to check the model’s accuracy. In order to perform this process first model test data on training data and then test data on testing data. Both training and testing data will give model accuracy and model efficiency. 6. Lastly, after evaluating this process will analyze and visualize data using tables and charts. These will include some results such as showing normal and fraudulent transactions, how many transactions will be fraudulent or legitimate, how many transactions will be done etc. To perform these tasks will use SPSS and Matplotlib tools as it is easy to use and show perfect tables and graphs. 7. Additionally, this research will recognize the fraud credit card detection, therefore, will add Python-based algorithm coding in this project to show how to implement the method step by step. |

Relationship of proposed project to MSc programme/stream:

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| This project is mainly based on the machine learning algorithm using Python as how it works to detect fraudulent credit cards. Additionally, credit card fraud is mostly related to the subject of Mobile Technology as learned new mobile technology growing day by day and because of this credit card fraud is significantly soaring in this digitalization world. Furthermore, Mobile technology also learned how to solve this issue using new technology and mitigate this problem in the future.  However, from the research design and methodology subject learned how to do research step by step and how to build the specification of the project. Moreover, it explains how to write aims, objectives, abstract, literature review, proposed method, and data analysis. On top of that this project is mostly related to research methods and it will be very helpful to develop research skills as well as give knowledge about how to write the dissertation. |

Indicative reading list and resources:

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| **References:**  Alfaiz, N.S. and Fati, S.M. (2022). Enhanced Credit Card Fraud Detection Model Using Machine Learning. *Electronics*, 11(4), p.662. doi:[10.3390/electronics11040662](file:///C:\Users\bhoom\Downloads\10.3390\electronics11040662).  Darwish, M. and belal (2022). APPLICABILITY OF SMART CONTRACTS FOR REAL ESTATE: A LITERATURE REVIEW. *Future Computing and Informatics Journal*, [online] 7(1). doi:[10.54623/fue.fcij.7.1.2](file:///C:\Users\bhoom\Downloads\10.54623\fue.fcij.7.1.2).  Fang, Y., Zhang, Y. and Huang, C. (2019). Credit Card Fraud Detection Based on Machine Learning. *Computers, Materials & Continua*, 61(1), pp.185–195. doi:[10.32604/cmc.2019.06144](file:///C:\Users\bhoom\Downloads\10.32604\cmc.2019.06144).  Garg, V., Chaudhary, S. and Mishra, A. (2021). ANALYSING AUTO ML MODEL FOR CREDIT CARD FRAUD DETECTION. *International Journal of Innovative Research in Computer Science & Technology*, 9(3). doi:[10.21276/ijircst.2021.9.3.5](file:///C:\Users\bhoom\Downloads\10.21276\ijircst.2021.9.3.5).  Ileberi, E., Sun, Y. and Wang, Z. (2022). A machine learning based credit card fraud detection using the GA algorithm for feature selection. *Journal of Big Data*, 9(1). doi:[10.1186/s40537-022-00573-8](file:///C:\Users\bhoom\Downloads\10.1186\s40537-022-00573-8).  Madhu, S. (2022). REVIEW on FRAUD DETECTION in CREDIT CARD TRANSACTIONS USING MACHINE LEARNING TECHNIQUES. *INTERANTIONAL JOURNAL OF SCIENTIFIC RESEARCH IN ENGINEERING AND MANAGEMENT*, 06(01). doi:[10.55041/ijsrem11522](file:///C:\Users\bhoom\Downloads\10.55041\ijsrem11522).  Marabad, S. (2021). CREDIT CARD FRAUD DETECTION USING MACHINE LEARNING. *ASIAN JOURNAL OF CONVERGENCE IN TECHNOLOGY*, 7(2), pp.121–127. doi:[10.33130/ajct.2021v07i02.023](file:///C:\Users\bhoom\Downloads\10.33130\ajct.2021v07i02.023).  Naik, H. and Kanikar, P. (2019). Credit card Fraud Detection based on Machine Learning Algorithms. *International Journal of Computer Applications*, 182(44), pp.8–12. doi:[10.5120/ijca2019918521](file:///C:\Users\bhoom\Downloads\10.5120\ijca2019918521).  SONI, K.B. (2021). Credit Card Fraud Detection Using Machine Learning Approach. *Applied Information System and Management (AISM)*, 4(2), pp.71–76. doi:[10.15408/aism.v4i2.20570](file:///C:\Users\bhoom\Downloads\10.15408\aism.v4i2.20570).  Warghade, S., Desai, S. and Patil, V. (2020). Credit Card Fraud Detection from Imbalanced Dataset Using Machine Learning Algorithm. *International Journal of Computer Trends and Technology*, 68(3), pp.22–28. doi:[10.14445/22312803/ijctt-v68i3p105](file:///C:\Users\bhoom\Downloads\10.14445\22312803\ijctt-v68i3p105).  Yaqoob, M.A. (2022). Credit Card Fraud Detection Using Hybrid Approach of Machine Learning. *International Journal for Research in Applied Science and Engineering Technology*, 10(6), pp.3154–3159. doi:[10.22214/ijraset.2022.44468](file:///C:\Users\bhoom\Downloads\10.22214\ijraset.2022.44468). |

Marking scheme:

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| Introduction 5%  Literature review (that sets the academic/theoretical underpinning) 20%  Methods (includes methods of implementation used for the mentioned protocols) 20%  Data analysis (includes the analysis of results collected through implementation) 15%  Discussion (and linkage to academic/theoretical underpinning) 20%  Conclusions and recommendations 10%  Critical self-evaluation 10% |

Supervisor:

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| Dr. Raja Ujjan |

Moderator:

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| Dr. Volkan Tunali |

Programme Leader:

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| Dr. Daune West |

Date specification submitted:

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| 16/09/2022 |

Please complete the ‘ethics’ form below for all projects.

**School of Computing, Engineering and Physical Sciences**

**MSc PROJECT – REQUIREMENT FOR ETHICAL APPROVAL**

**SECTION 1: TO BE COMPLETED BY THE STUDENT**

Does your proposed research involve: research with human subjects (including requirements gathering and product/software testing), access to company documents/records, questionnaires, surveys, focus groups and/or other interview techniques? Does your research entail any process which requires ethical approval? (please enter √ in the appropriate box)

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| --- | --- | --- |
| YES |  | **You must submit an application for approval to the Ethics Review Manager** |
| NO | √ | You do not need to submit an application to the Ethics Review Manager |

**Name of Student (Print name):**

**Signature:**

**Date:**

**SECTION 2: TO BE COMPLETED BY THE PROJECT SUPERVISOR**

I understand that the above project does not require\* ethical approval.

**Supervisor (print name):** Raja Ujjan

**Signature**: A close-up of a sword

Description automatically generated with low confidence

**Date: 23/09/22**

**IMPORTANT: please note that by signing this form all signatories are confirming that any potential ethical issues have been considered and, where necessary, an application for ethical approval has been/will be made via the Ethical Review Manager software.**

**Any project requiring ethical approval but which has not been given approval will not be accepted for marking.**

**Ethical approval cannot be sought in retrospect.**