Types of Models:

Classification, Clustering, and Anomaly Detection

Motivation for the Models:

In today's banking world, Machine Learning has become essential for enhancing security, efficiency, and providing personalized financial services. Below are three key applications:

1. Fraud Detection in Banking Transactions
    - Technique Used: Utilizing models that detect unusual behaviors, such as *Autoencoders*, complemented by classification algorithms like *Random Forest*.
    - Motivation: Early fraud detection is crucial to protect the assets and reputation of banking institutions. A recent study presented a hybrid model combining multiple algorithms, achieving 100% accuracy in identifying fraudulent transactions.

2. Segmentation of Banking Customers
    - Technique Used: Applying clustering algorithms like *K-Means* to classify customers based on their financial behaviors.
    - Motivation: Effective segmentation allows banks to offer products and services tailored to the specific needs of each customer group, enhancing satisfaction and loyalty. For instance, a major bank in Azerbaijan used clustering techniques to segment customers, resulting in more effective marketing strategies and improved customer retention.
3. Credit Risk Prediction
    - Technique Used: Employing classification models such as *Logistic Regression* and *Neural Networks* to assess the likelihood of a loan applicant defaulting.
    - Motivation: Accurately evaluating credit risk is fundamental to minimize financial losses and maintain the economic stability of banking institutions. Applying Machine Learning techniques in this area has significantly improved the precision of risk assessment, enabling more informed decisions in credit granting.

References in APA 7th Edition Format:

Aliyev, M., Ahmadov, E., Gadirli, H., Mammadova, A., & Alasgarov, E. (2020, 19 agosto). *Segmenting Bank Customers via RFM Model and Unsupervised Machine Learning*. arXiv.org. https://arxiv.org/abs/2008.08662

Gabriela, E. L. (2024, 1 septiembre). *Machine Learning para la estimación de riesgo de crédito de una cartera de consumo*. https://docta.ucm.es/entities/publication/fc512956-4b59-4f40-ab93-18850315b2a3

Talukder, M. A., Hossen, R., Uddin, M. A., Uddin, M. N., & Acharjee, U. K. (2024, 22 febrero). *Securing Transactions: A Hybrid Dependable Ensemble Machine Learning Model using IHT-LR and Grid Search*. arXiv.org. https://arxiv.org/abs/2402.14389

Tamarit Domínguez, J. T. D. (2021). *Inteligencia artificial para la detección de fraude en transacciones realizadas con tarjetas de crédito* (R. M. C. Martín Clemente, Ed.) [Tesis de maestria, Universidad de Sevilla]. https://biblus.us.es/bibing/proyectos/abreproy/72024/fichero/TFM-2024%2BTAMARIT%2BDOMÍNGUEZ%2C%2BJESÚS.pdf

RPubs - Segmentación de clientes mediante K-means. (s. f.). https://rpubs.com/Jennifer-Salazar/segmentacion_clientes_TAE

Carlos, S. C. F., & De Ingeniería Informática, U. D. (2014, 1 septiembre). *Random Forests para detección de fraude en medios de pago*. Universidad Autónoma de Madrid. https://repositorio.uam.es/handle/10486/662543