

**Transport and Telecommunication Institute**

**Faculty of Engineering Science**

**Artificial Intelligence Group Project**

**Project proposal**

***“ADVERSE MEDIA MONITORING AND CLIENT RISK ASSESSMENT SYSTEM”***

Students: Natalija Krjuckova, Sergejs Kopils, Agita Ferstere, Diāna Koržaviha

Student’s IDs: ###, ###, ###, ST58392

Study Group: 4303MDA

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# Main Problem

*With the growing importance of monitoring client activities, to improve the identification of customer problems, automated risk assessment has become essential.* *For the purpose of to helping financial institutions better detect possible problems with their clients, this project intends to create a system for tracking adverse media coverage and evaluating client risk.* *By looking through publicly available negative information, such as news articles, court documents, regulatory filings, and social media, the technology will automatically assess clients and group them into risk groups. This method aims to give a deeper look of consumer data while reducing manual work.*

*The system will use techniques including ingestion of firm data, online scraping to collect media content, unsupervised analysis, and media article classification. A supervised model will be trained using the labelled data produced by the unsupervised analysis to determine client risk. This strategy will assist protect institutions' reputations and reduce their susceptibility to financial crimes by guaranteeing adherence to Know Your Customer (KYC) and Anti-Money Laundering (AML) regulations.*

# Initial Research on the Problem Domain

*Previous investigations on adverse media monitoring and customer risk evaluation underscore the significance of Natural Language Processing (NLP) and Artificial Intelligence (AI) in enhancing efficiency and precision* (Banerjee and Roy, 2022)*. Literature on AML and KYC compliance underscores the need for automated tools capable of handling large datasets from diverse public sources, such as news articles, regulatory filings, social media, and court records* (Khandpur *et al.*, 2021)*. Existing products mainly use the existing library of media resources and infrequently incorporate hybrid machine learning approaches that combine supervised and unsupervised models for adaptive risk profiling. This results in a lack of sensitivity to subject-specific context and limited information on emerging risks* (Emmanuel Agwu, 2023)*.*

# Project Objectives and Scope

**The objectives of this project are:**

* To implement data aggregation techniques to assess client risks by analyzing adverse media content;
* To implement machine learning models for identification of adverse media related to financial crimes for client risk classification;
* To assess the ability of chosen algorithms, classify clients into different risk categories;
* To evaluate algorithm performance in terms of accuracy for client’s classification into different risk categories;

**Out of Scope:**

* Transaction monitoring of client
* Closed-source private databases or proprietary client information

# Proposed Work Activities

It is expected that tools, frameworks and libraries will be chosen depending on test results of each method.

1. Automatic collection of customer references in media (Web Scraping) – it is planned to use such tools, frameworks and libraries: Selenium, BeautifulSoup, Scrapy, Airflow and API for sources, that provide API for accessing publications. The following list of subtasks should be completed in this part:
   1. Defining resources for data collecting.
   2. Keywords list creation for content filtering based on company names.
   3. Automatic scripts developing and configuring, that includes requesting, parsing HTML and extracting data, keyword filtering, saving data and scheduling regular data collections.
2. Classification of collected data for risk assessment:
   1. Collected data preprocessing – converting text into a clean sequence of keywords, ready for vectorization.
   2. Converting Text to Vector data – converting data into a numerical representation using TF-IDF, Word2Vec or GloVe so that clustering algorithms can process them.
   3. Clustering using K-means or DBSCAN algorithms.
   4. Analysis and cluster interpretation - to determine which groups of articles may be associated with risk. Cluster interpretation can be conducted by analysis of keywords and topics in each cluster, manual verification of articles and assignment of risk levels.
   5. Cluster evaluation and improvement – that includes checking the clustering results and anomalies, number of clusters increasing or decreasing will be performed if necessary.
   6. Final Evaluation and Report - after clustering and interpreting the clusters, a descriptive report should be prepared describing each cluster and its risk level (high, medium, low).
   7. Assigning a risk level to each client—identifying the appropriate risk level for each client based on their association with clusters.
3. Model training based on the results
   1. Building and training a model that will automatically identify risky customers based on collected data – will use one of these models: Logistic regression, random forest or gradient boosting (XGBoost). Clusters will be used as labelled data, and data will be split into training (80%) and testing (20%) datasets.
4. Model evaluation and testing
   1. Evaluation metrics (Precision, Recall, F1-score) will be used for a comprehensive assessment of the model, for model accuracy evaluation.
   2. Model can be reconfigured based on the evaluation results.
5. Applying the model and generating a risk report
   1. Model will be applied to new data – new articles mentioning clients, as a result of modelling will be a report for each client, that includes the number and content of articles associated with the client, risk level (high, medium, low).

# Project Management Methodology

This project will use an Agile project management approach with Kanban project management framework to enable continuous feedback and adaptability throughout the development process. The project tasks have been broken into iterative sprints, with specific goals for each sprint. GitHub's planning and tracking tools would be used to manage project with support of regular Teams calls as additional communication method.

**Workflow Diagram**

*The diagram below visually represents the project's key processes, from data collection to risk report generation. The workflow starts with loading company data, gathering media content, performing unsupervised analysis, and classifying media articles. After identifying clients requiring further investigation, risk scores are assigned, and the final supervised model is applied to generate a risk report.*

**Conclusion**

*This project aims to develop an effective automated risk assessment system to assist financial institutions in mitigating risks related to financial crimes through analysing adverse media data and delivering an extensive assessment of clients* (Mwangi, 2024)*.*

# REFERENCES

1. Kaggle. *Synthetic Financial Datasets for Fraud Detection*. [Link](https://www.kaggle.com/search?q=synthetic+financial+datasets+for+fraud+detection) - accessed 21.10.2024.
2. Kaggle. *Nifty50 Companies ESG Score Data*. [Link](https://www.kaggle.com/datasets/akulvaishnavi/nifty50-companies-esg-score-data) - accessed 21.10.2024.
3. ProjectPro. *8 Feature Engineering Techniques for Machine Learning*. [Link](https://www.projectpro.io/article/8-feature-engineering-techniques-for-machine-learning/423) - accessed 21.10.2024.
4. Reddit. *Clustering Approach for Multidimensional Vectors*. [Link](https://www.reddit.com/r/MachineLearning/comments/15alpxe/p_clustering_approach_for_multidimensional_vectors/) - accessed 21.10.2024.
5. Medium. *Web Scraping with Python: Automate Negative News Screening (NNS) at Internet Search Engine*. [Link](https://medium.com/@jasonclwu/web-scraping-with-python-automate-negative-news-screening-nns-at-internet-search-engine-c99697080b14) - accessed 21.10.2024.
6. GitHub. *Vector Embeddings by Pavan Belagatti*. [Link](https://github.com/pavanbelagatti/vector-embeddings) - accessed 21.10.2024.
7. Zilliz. *Applying Vector Databases in Finance for Risk and Fraud Analysis*. [Link](https://zilliz.com/learn/applying-vector-databases-in-finance-for-risk-and-fraud-analysis) - accessed 21.10.2024.
8. Sanction Scanner. *Adverse Media*. [Link](https://www.sanctionscanner.com/knowledge-base/adverse-media-144) - accessed 21.10.2024.
9. GeeksforGeeks. *Fake News Detection Model using TensorFlow in Python*. [Link](https://www.geeksforgeeks.org/fake-news-detection-model-using-tensorflow-in-python/) - accessed 21.10.2024.
10. Banerjee, P. and Roy, R. (2022) Integrating Natural Language Processing (NLP) in AML Compliance and Monitoring. 11.
11. Emmanuel Agwu (2023) *A Practical Guide to Adverse Media Screening: Best Practices and Tools* *Youverify website*. 3 August 2023 [online]. Available from: https://youverify.co/blog/practical-guide-to-adverse-media-screening [Accessed 23 October 2024].
12. Khandpur, R.P., Nanda, A.A., Davis, M., Li, C., Nurmanbetov, D., Gaur, S. and Talukder, A. (2021) *Adverse Media Mining for KYC and ESG Compliance* [online]. Available from: http://arxiv.org/abs/2110.11542 [Accessed 23 October 2024].
13. Mwangi, M. (2024) The Role of Machine Learning in Enhancing Risk Management Strategies in Financial Institutions. *International Journal of Modern Risk Management* [online]. 2 (1), pp. 44–53. Available from: https://iprjb.org/journals/index.php/IJMRM/article/view/2643 [Accessed 23 October 2024].