



Beyond the Contract

An Analytical Approach to Supplier Risk Assessment

Business Problem

In today's rapidly evolving business landscape, there is a rising number of risk-related incidents involving vendors, causing disruptions to businesses and tarnishing their reputations.



The current Third-Party Risk Management (TPRM) framework used by our client to assess vendor IT & operations risks is not able to mitigate risks completely, presenting a significant challenge in determining which vendor is the best for its project.



Analytical Problem Framing

Traditional TPRM processes focus mostly on Financial & IT security risk, thereby failing to capture risk effectively. Assuming that the performance of high-risk organizations are poor, our model aims to incorporate additional factors like Compliance Risk, Operational Risk, ESG Risk to design a robust methodology and create an enhanced risk score for suppliers. Leveraging analytical methods like feature extraction and machine learning, the aim is to assign weights to a multitude of factors and design a composite Risk scoring methodology, which encompasses and improves risk identification & mitigation.

Success Metrics

Misclassification Rate
Precision
Recall

2 key questions the model answers:

How can organizations create an effective baseline scorecard and analytical model for evaluating supplier risks ?

What are the most efficient criteria for identifying and mitigating risks in supplier relationships?

Data Section Summary

Our proposed process involves collecting data across 5 KRIs which totals to 112 metrics for evaluation.

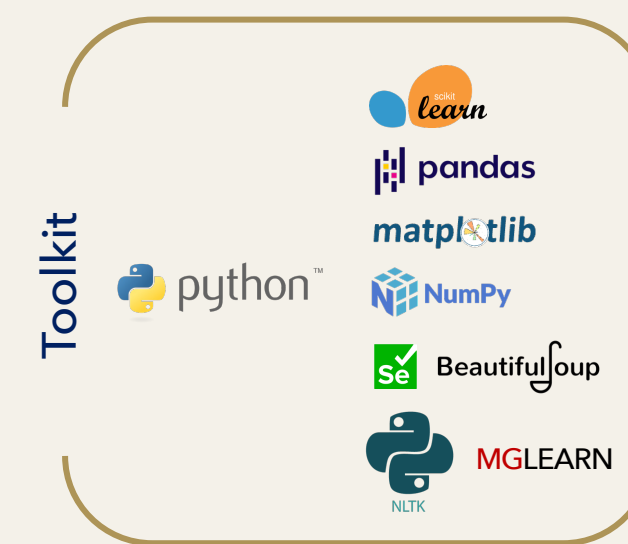
Data pre-processing encompasses several key steps to refine data for analysis: filling missing values for integrity, converting categorical data into binary vectors through one-hot encoding for accuracy, transforming text to numerical categories for better analysis, removing stop words to improve sentiment analysis, and employing lambda functions for directional interpretation of parameters, assigning positive or negative outcomes based on values.

	IT Security	Compliance	Financial	Operational	ESG
External	0	2	64	3	3
Internal	20	6	0	14	0

External Data Sources: FSI, IMF, SEC, FTC, Company Annual Reports, News Articles

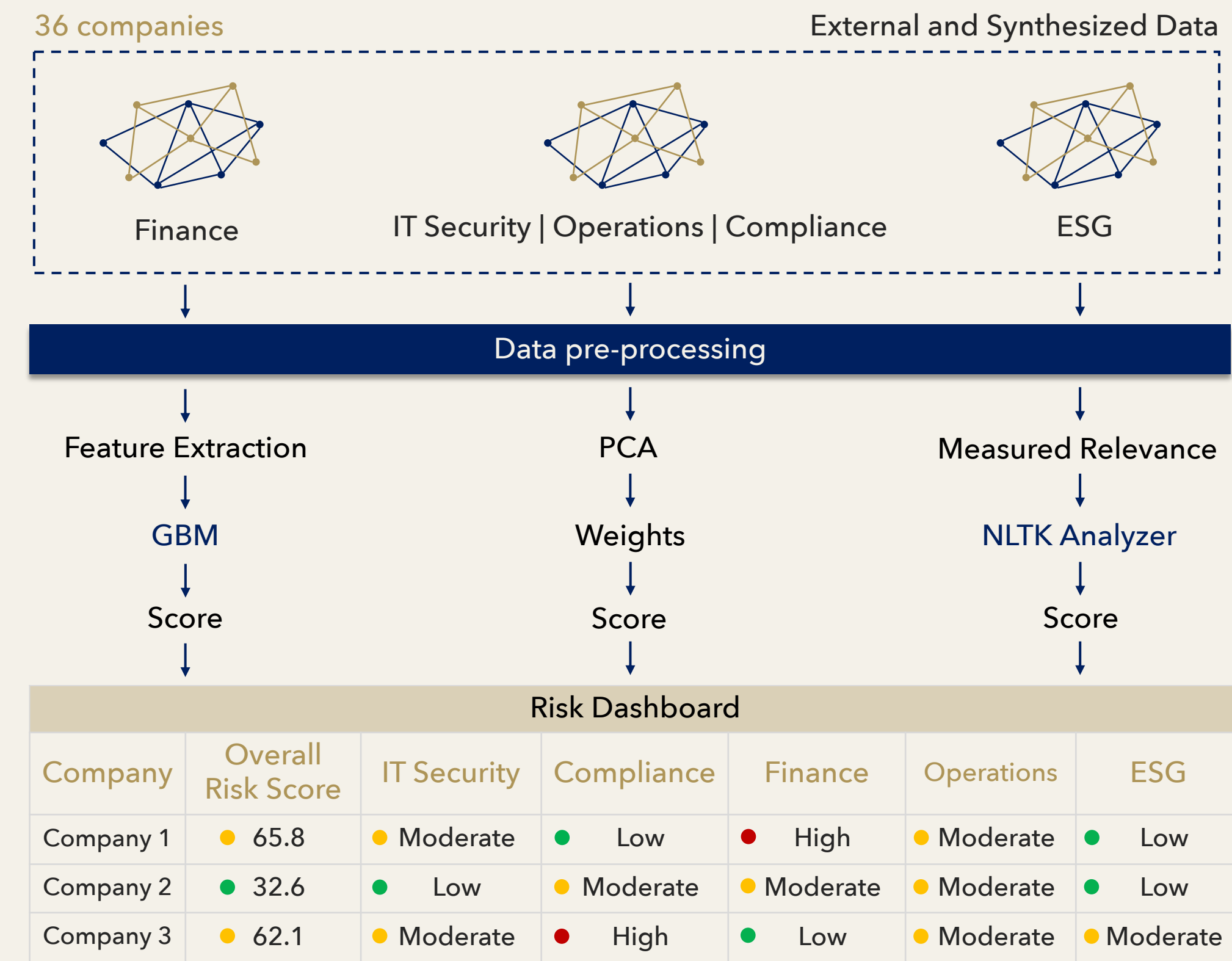
Methodology

Our Methodology involves creating an Organization Risk score for each Key Risk Indicator and creating a composite Final Risk Score for each organization denoting Overall Risk. We leveraged various public data sources using web-scraping and synthesized some of the data points, owing to limited data availability from our client. We then used feature extraction and machine learning techniques on the dataset to determine the weights of the underlying parameters, normalized the weights and used these to arrive at final risk scores.

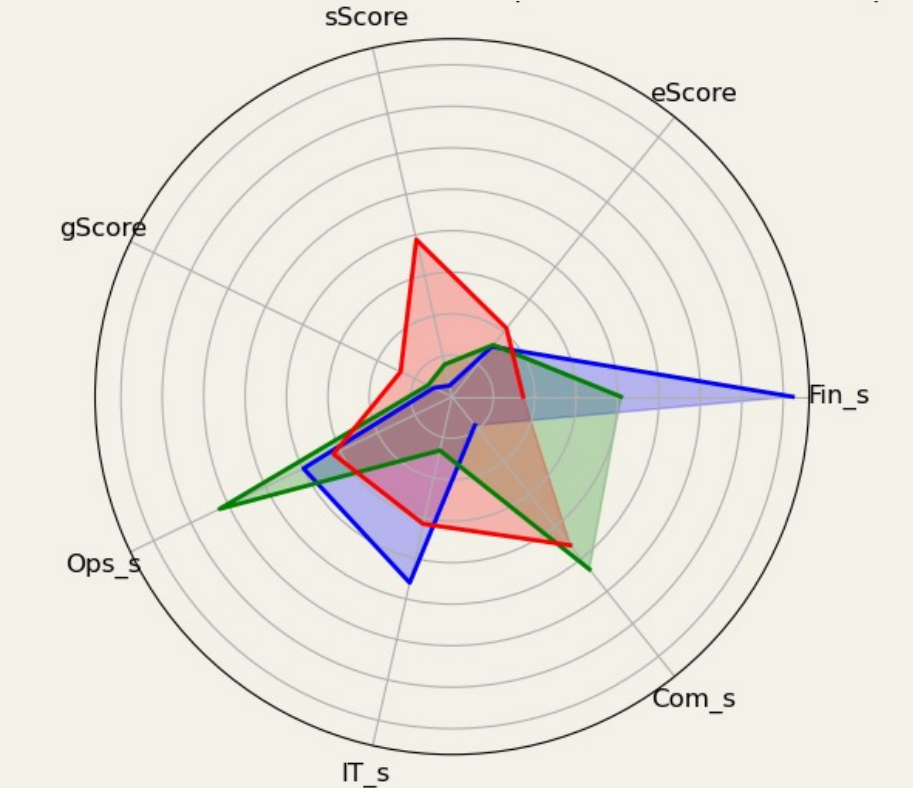


- EXPERIMENTS**
- We experimented with cluster analysis using K-Means algorithm to identify similar organization risk profiles, however the approach lacked in creating differentiation within a cluster.
 - We used Logistic Regression, SVM, Naive Bayes & GBM for identifying top parameters in our Financial Score model. GBM was chosen for final model for its high accuracy (92.1%).
 - We had initially identified a sixth KRI "Reputation Risk". However, the Reputation Risk score had very high correlation with "ESG Risk" score, due to which we dropped it from our final model.

Model Building and Results

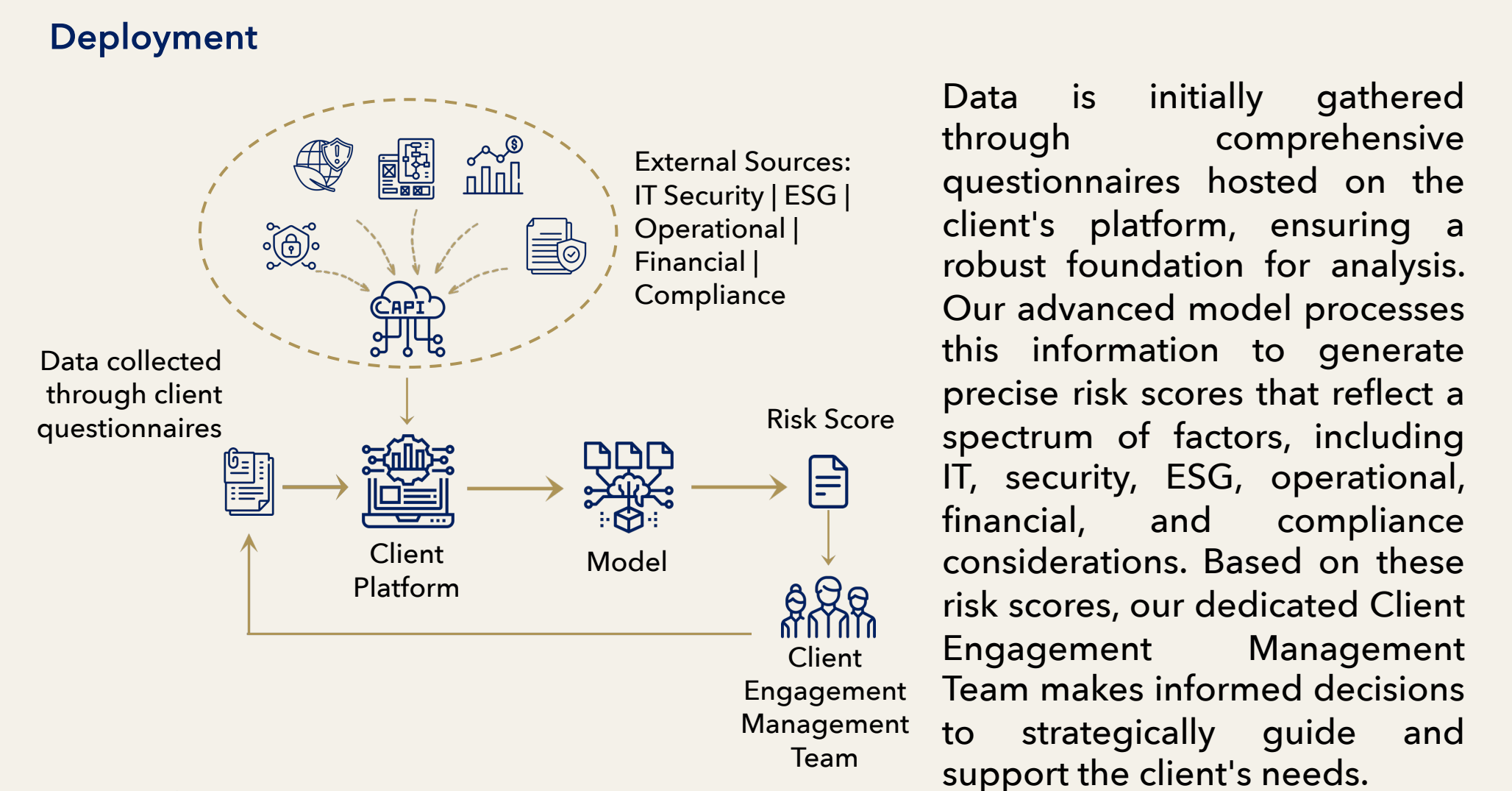


Bar Graph showing the weights of individual KRI scores used in the final Risk score of organizations, based on current input values. Finance Score has the highest weightage among all the scores.



Areas of improvement
Currently, the model evaluates organizational risk but overlooks engagement-specific risks such as Confidential Data Access and Supplier Lock-in, which are crucial for a detailed risk assessment. Limited and mostly unlabelled data restrict our analysis; incorporating paid, correctly labelled sources could significantly enhance model performance and enable benchmarking.

Deployment & Future Scope



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