

**#include<GenAI>**

presents

# **AERIS: AI-Enabled Risk and Intelligence System**

## **Team**

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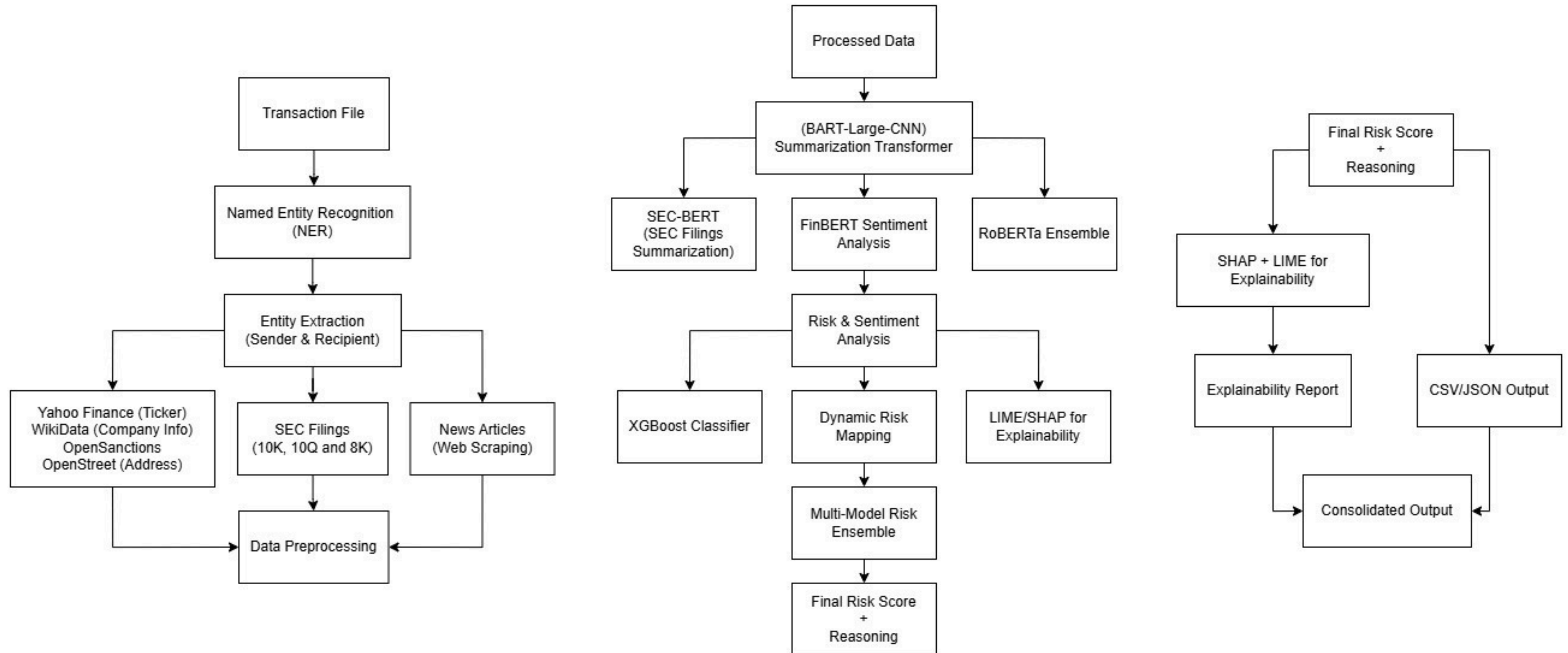
Lakshetha T

Chanukya Balli

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# ML Pipeline Diagram

**Entity Extraction & Data Scraping** → **Risk and Sentiment Analysis** → **Scoring and Reasoning**



# Entity Extraction

## Structured input

```
df_unstructured = parse_transaction_file("/content/transactions.csv")
pd.set_option("display.max_columns", None)
pd.set_option("display.width", 200)
pd.set_option("display.colheader_justify", "center")
pd.set_option("display.max_colwidth", None)
print(df_unstructured.head())
```

	Transaction ID	Date	Sender Name	Sender Account	Sender Address	Receiver Name	Receiver Account	Receiver Address	Amount	Transaction Type
0	TXN-2023-5A9B	2023-08-15 14:22:00	Global Horizons Consulting LLC	IBAN CH56 0483 5012 3456 7800 9 (Swiss bank)	Rue du Marché 17, Geneva, Switzerland	Bright Future Nonprofit Inc	987654321 (Cayman National Bank, KY)	P.O. Box 1237, George Town, Cayman Islands	49850.0	Wire Transfer
1	TXN-2023-7C8D	2023-09-10 11:30:00	Sunrise Trading Co	IBAN DE89 3704 0044 0532 0130 00 (Deutsche Bank)	Friedrichstr. 12, Berlin, Germany	Hope Foundation	1122334455 (HSBC UK)	10 Downing Street, London, UK	105000.5	Wire Transfer
2	TXN-2023-9X0Y	2023-11-20 16:45:00	FutureTech Solutions	IBAN US29 1234 5678 9101 1121 (Bank of America)	500 Silicon Valley Blvd, CA, USA	Global Aid Organization	5566778899 (Barclays Bank)	99 Charity Street, Nairobi, Kenya	75000.0	ACH Payment

## Semi-structured input

```
df = parse_transaction_file("/content/entity_semistructured.txt")
pd.set_option("display.max_columns", None)
pd.set_option("display.expand_frame_repr", False)
pd.set_option("display.max_colwidth", None)
print(df.head())
```

	Transaction ID	Date	Sender Name	Sender Beneficiary	Receiver Name	Amount	Currency Exchange	Transaction Type	Reference	Additional Notes
0	TXN-2023-7C2D	2023-08-15 14:25:00	Quantum Holdings Ltd	Maria Gonzalez	Golden Sands Trading FZE	950,000.00	EUR -> USD (Rate: 1.12)	SWIFT	Commodity Trade Settlement - Contract #DX-889	Invoice attached: 'Oil Equipment Procurement' (PDF missing metadata).
1	TXN-2023-5A9B	2023-08-15 14:22:00	Global Horizons Consulting LLC	NaN	Bright Future Nonprofit Inc	49,850.00	N/A	Wire Transfer	Charitable Donation - Ref #DR-2023-0815	Linked invoice missing. Processed via intermediary Quantum Holdings Ltd (BVI).

## Unstructured input

```
df = parse_transaction_file("/content/entity_unstructured.txt")
pd.set_option("display.max_columns", None)
pd.set_option("display.expand_frame_repr", False)
pd.set_option("display.max_colwidth", None)
print(df.head())
```

	ORG	PERSON	GPE	MONEY
0		Entity B	Blocked Person X	
1	Alice Smith, John, SB Bank, Barclay London	Do	United Kingdom, New York	
2	Google LLC Morgan			

# Data Scrapping Results

Enter Company Name: Atlas Technology Group Inc.

### Gathered Company Information ###

Company Name: Atlas Technology Group Inc.  
Headquarters: N/A  
Website: N/A  
Description: N/A  
Stock Symbol: ATYG  
Market Cap: 2996339  
Exchange: PNK  
Currency: USD  
Industry: Shell Companies  
CEO: N/A  
Employees: N/A

### Structured Risk Assessment ###

```
{
  "Transaction ID": "TXN12345",
  "Extracted Entity": [
    "Atlas Technology Group Inc."
  ],
  "Entity Type": [
    "Shell Company"
  ],
  "Supporting Evidence": [
    "Google Search (SerpAPI)",
    "Yahoo Finance",
    "Wikipedia"
  ],
  "Confidence Score": 0.95,
  "Reason": "Atlas Technology Group Inc. is categorized as Shell Company."
}
```

Data Scrapping Output for Shell Company

# SEC Risk Score

Risk analysis with explanations saved to risk\_analysis\_with\_explanations.csv

	company	ticker	form_type	filed_date	filing_url	filing_content	risk_label	risk_score	explanation
0	Tesla, Inc.	TSLA	10-K	2025-01-29T20:42:33-05:00	<a href="https://www.sec.gov/Archives/edgar/data/131860...">https://www.sec.gov/Archives/edgar/data/131860...</a>	tsla-20241231false00013186052024FYhttp://fasb...	LABEL_0	0.549124	RevenueFromContractWithCustomerExcludingAssess...
1	Tesla, Inc.	TSLA	8-K	2025-01-29T16:09:13-05:00	<a href="https://www.sec.gov/Archives/edgar/data/131860...">https://www.sec.gov/Archives/edgar/data/131860...</a>	tsla-20250129FALSE000131860500013186052025-01-...	LABEL_0	0.620504	Check the appropriate box below if the Form 8-...
2	Tesla, Inc.	TSLA	8-K	2025-01-02T09:06:39-05:00	<a href="https://www.sec.gov/Archives/edgar/data/131860...">https://www.sec.gov/Archives/edgar/data/131860...</a>	tsla-20250102FALSE000131860500013186052025-01-...	LABEL_0	0.617263	On January 2, 2025, Tesla, Inc. published the ...
3	Tesla, Inc.	TSLA	10-Q	2024-10-23T20:42:47-04:00	<a href="https://www.sec.gov/Archives/edgar/data/131860...">https://www.sec.gov/Archives/edgar/data/131860...</a>	tsla-20240930000131860512-31false2024Q3immat...	LABEL_0	0.596560	. tsla-20240930000131860512-31false2024Q3immat...
4	Tesla, Inc.	TSLA	8-K	2024-10-23T16:09:26-04:00	<a href="https://www.sec.gov/Archives/edgar/data/131860...">https://www.sec.gov/Archives/edgar/data/131860...</a>	tsla-20241023FALSE000131860500013186052024-10-...	LABEL_0	0.611931	Check the appropriate box below if the Form 8-...

SEC-BERT is a domain-specific BERT model fine-tuned on financial and regulatory texts from the U.S. Securities and Exchange Commission (SEC) filings. It is developed by nlpauweb to improve NLP tasks in financial contexts, such as risk assessment, fraud detection, and financial entity recognition.

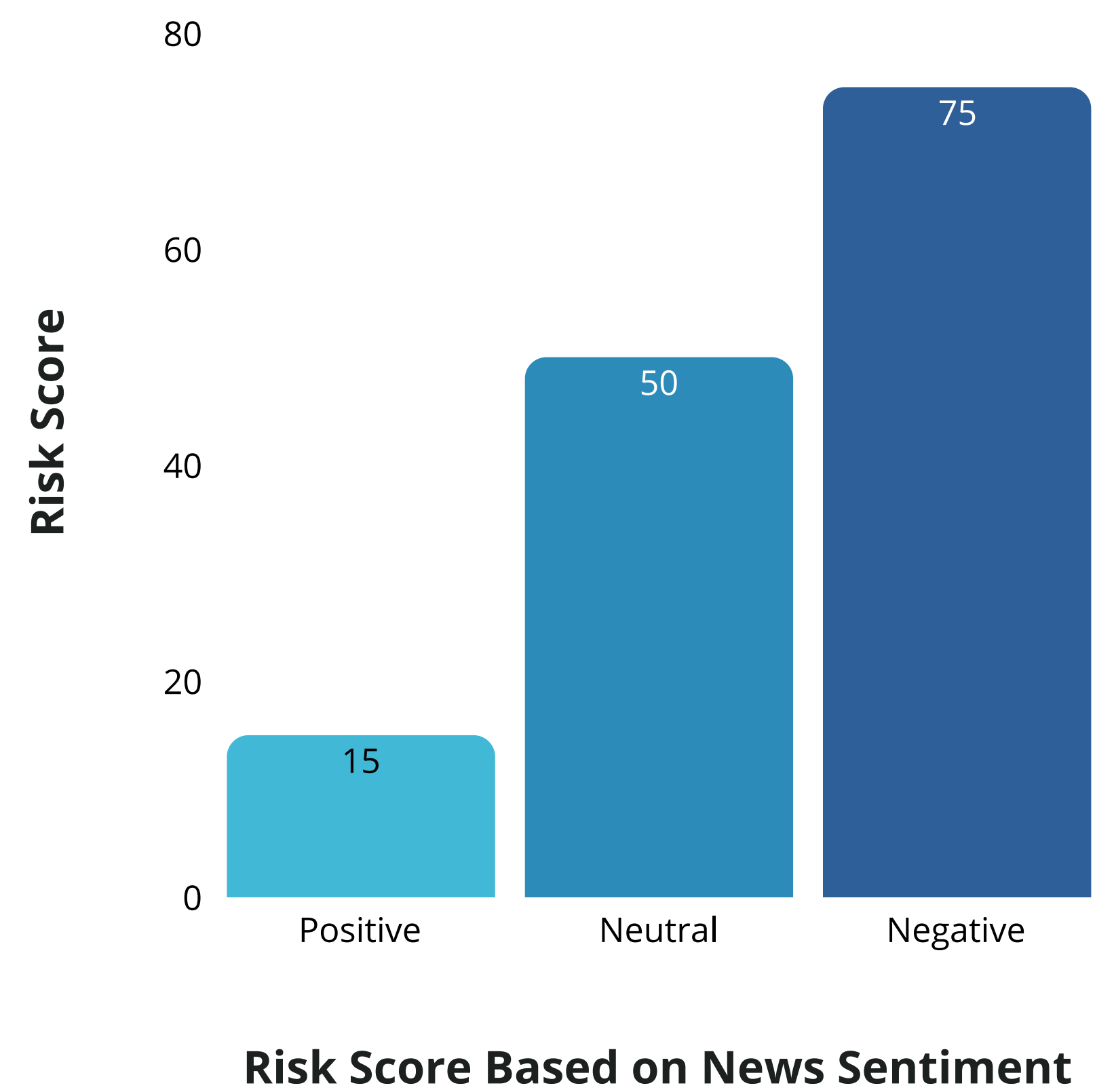
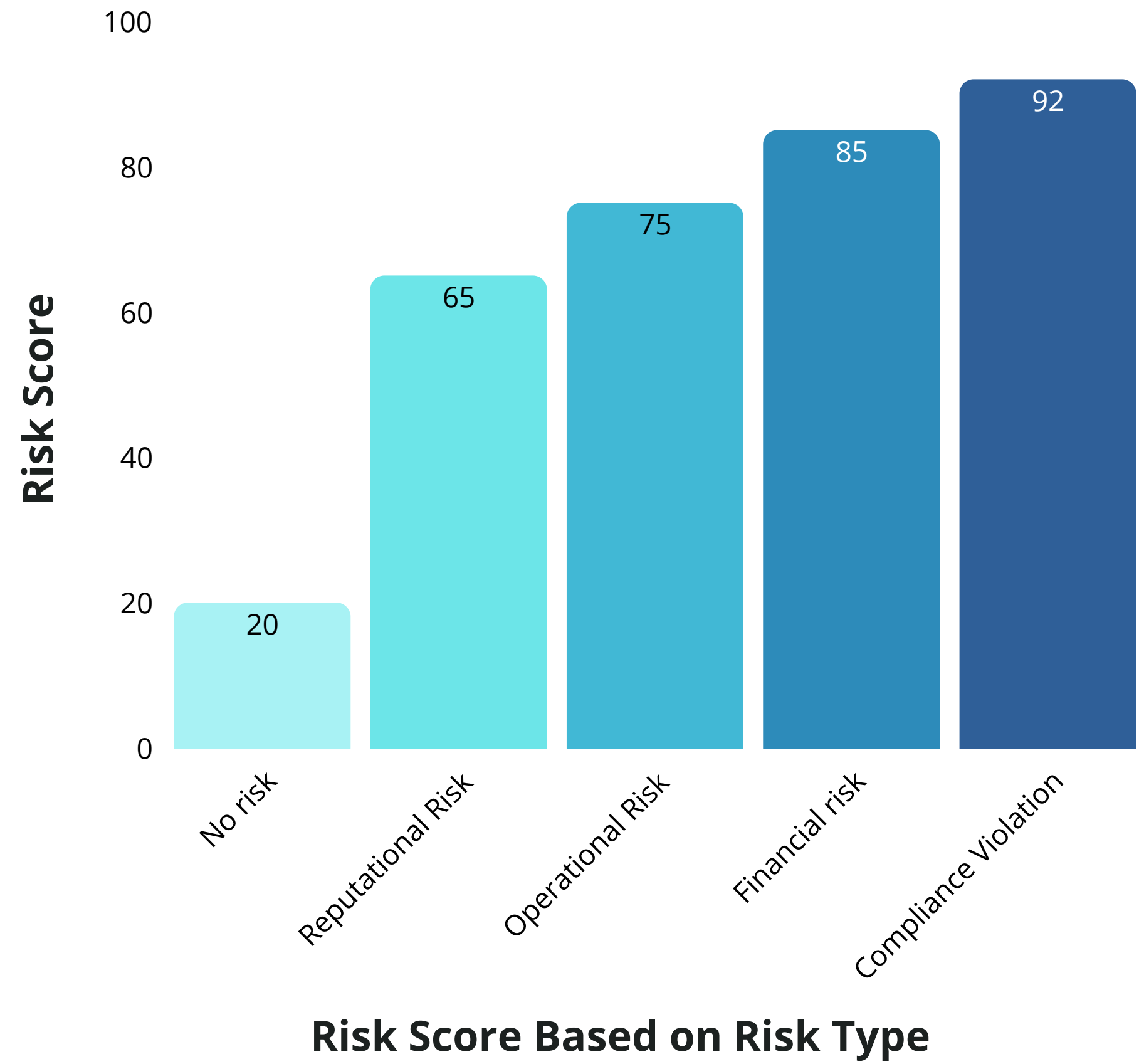
# Risk & Confidence Scoring Results

```
Device set to use cpu
Device set to use cpu
The company is under SEC investigation for compliance violations.
The firm faces allegations of insider trading and regulatory breaches.
Company has shown steady profits and stocks are up by 25% since last quarter
```

```
Text Sentiment \
0 The company is under SEC investigation for com... negative
1 The firm faces allegations of insider trading ... negative
2 Company has shown steady profits and stocks ar... positive
```

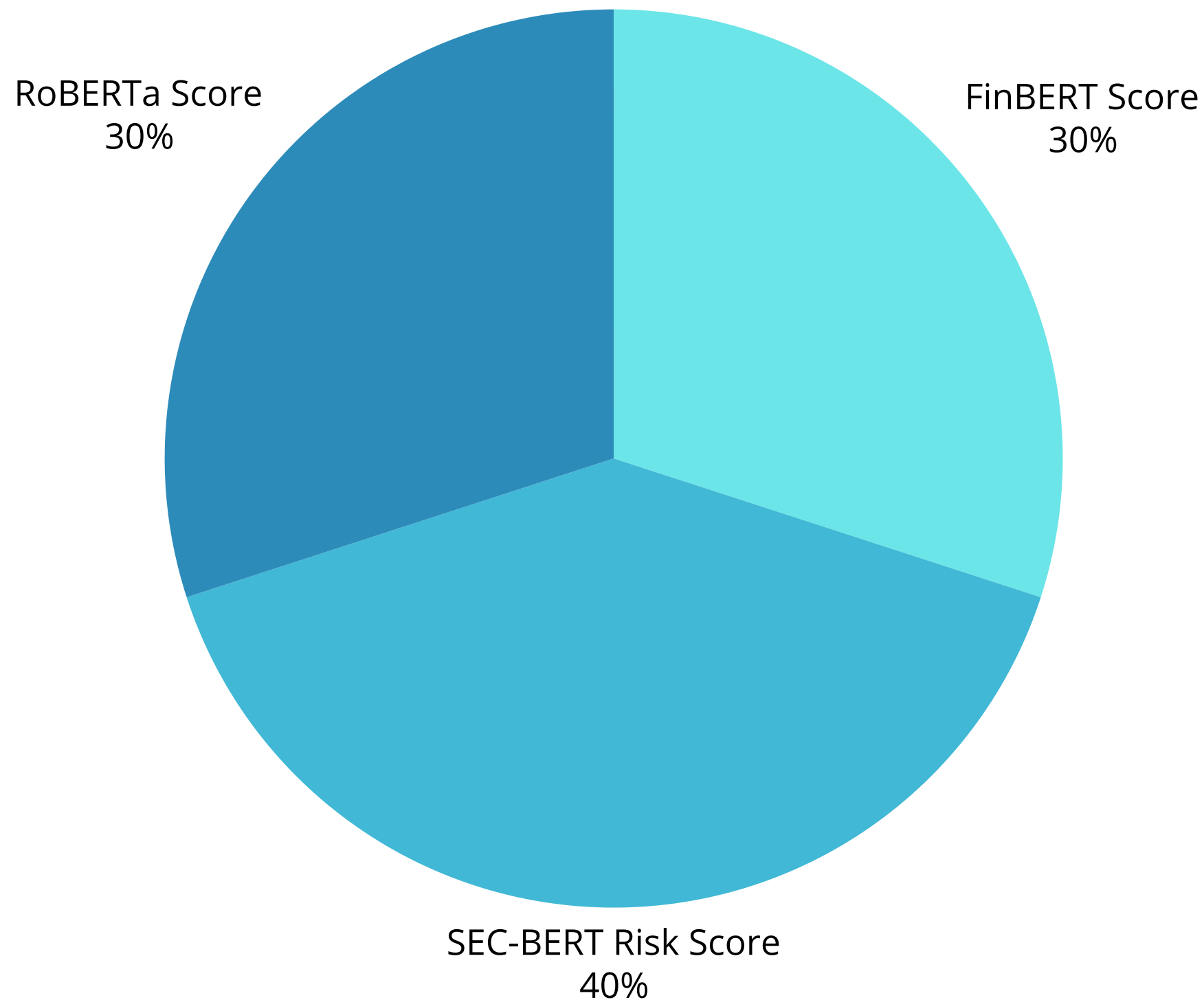
	Confidence_Score	risk_Score
0	0.94	90.0
1	0.97	90.0
2	0.98	10.0

# News Data Risk Mapping



# Weighted Risk Calculation

## using XGBoost



### Example :

FinBERT Score = 50

SEC-BERT Risk Score = 85

RoBERTa Risk Score = 75

$$\begin{aligned}\text{Final Risk Score} &= (0.3 \times \text{FinBERT Score}) \\ &+ (0.4 \times \text{SEC-BERT Risk}) \\ &+ (0.3 \times \text{RoBERTa Risk}) \\ &= (0.3 \times 50) + (0.4 \times 85) + (0.3 \times 75) \\ &= \mathbf{71.5}\end{aligned}$$



# Explainability

Explainability is needed in AI models to ensure transparency, accountability, and regulatory compliance, helping users understand and trust AI-driven decisions.

## Example :

**Input :** The company faces an SEC investigation and a lawsuit over alleged fraud in financial reporting.

**Output :** High Risk

## Explainable AI methods :

SHAP Explanation : "SEC Investigation (+0.8), Lawsuit (+0.6), Fraud (+0.5)"

LIME Explanation : "Classified as High Risk because 'SEC', 'Fraud' appeared in the text."

# AERIS UI

## Risk Analysis

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 Search by ID, Payer or Receiver

Upload File

Transaction ID	Payer	Receiver	Transaction Details	Amount	Country	Risk Score	Confidence Score	Actions		
1000020001	TechCorp Ltd	FinanceHub Inc	Purchase	\$10M	USA	0.9	0.95	Summary	Report	Download
1004000002	GlobalBank PLC	RetailTrade LLC	Transfer	\$20M	UK	0.7	0.85	Summary	Report	Download
1000600003	GreenEnergy Co.	EcoFinance Ltd	Refund	\$5M	Canada	0.6	0.8	Summary	Report	Download
1000500004	HealthMed Corp	WellnessTech Inc	Payment	\$50M	USA	0.95	0.9	Summary	Report	Download
1100000005	AutoMotive Group	SpeedyParts LLC	Purchase	\$30M	Australia	0.4	0.7	Summary	Report	Download
1000000006	FoodSupply Ltd	FreshFarm Inc	Donation	\$15M	Germany	0.8	0.88	Summary	Report	Download
1000006007	LuxuryHomes Ltd	RealEstatePro LLC	Transfer	\$25M	Spain	0.45	0.75	Summary	Report	Download
1004000008	CyberSecure Ltd	DataProtect Inc	Payment	\$100M	USA	0.85	0.92	Summary	Report	Download
1000500009	SmartTech Solutions	InnoGadgets Ltd	Refund	\$15M	Canada	0.6	0.8	Summary	Report	Download

# AERIS Transaction Summary UI

Risk Analysis

Home

About

Contact

Q Search by ID, Payer or Receiver

Upload File

Transaction ID	Payer	Receiver	Transaction Details	Amount	Country	Risk Score	Confidence Score	Actions
1000020001	TechCorp Ltd	FinanceHub Inc	P				0.95	<div>SummaryReportDownload</div>
1004000002	GlobalBank PLC	RetailTrade LLC	T				0.85	<div>SummaryReportDownload</div>
1000600003	GreenEnergy Co.	EcoFinance Ltd	F				0.8	<div>SummaryReportDownload</div>
1000500004	HealthMed Corp	WellnessTech Inc	P				0.9	<div>SummaryReportDownload</div>
1100000005	AutoMotive Group	SpeedyParts LLC	P				0.7	<div>SummaryReportDownload</div>

Transaction Summary

Transaction ID: 1000020001

Extracted Entity: [ TechCorp Ltd ], [ FinanceHub Inc ]

Entity Type: [ Opencorporates, Corporation ]

Risk Score: 0.9

Confidence Score: 0.95

Supporting Evidence: [ Opencorporates, Company website ]

Reason: TechCorp Ltd is not on sanctions list but an entity of interest. It is owned by USA businessman and related to FinanceHub Inc, a sanctioned entity.

Download

Report

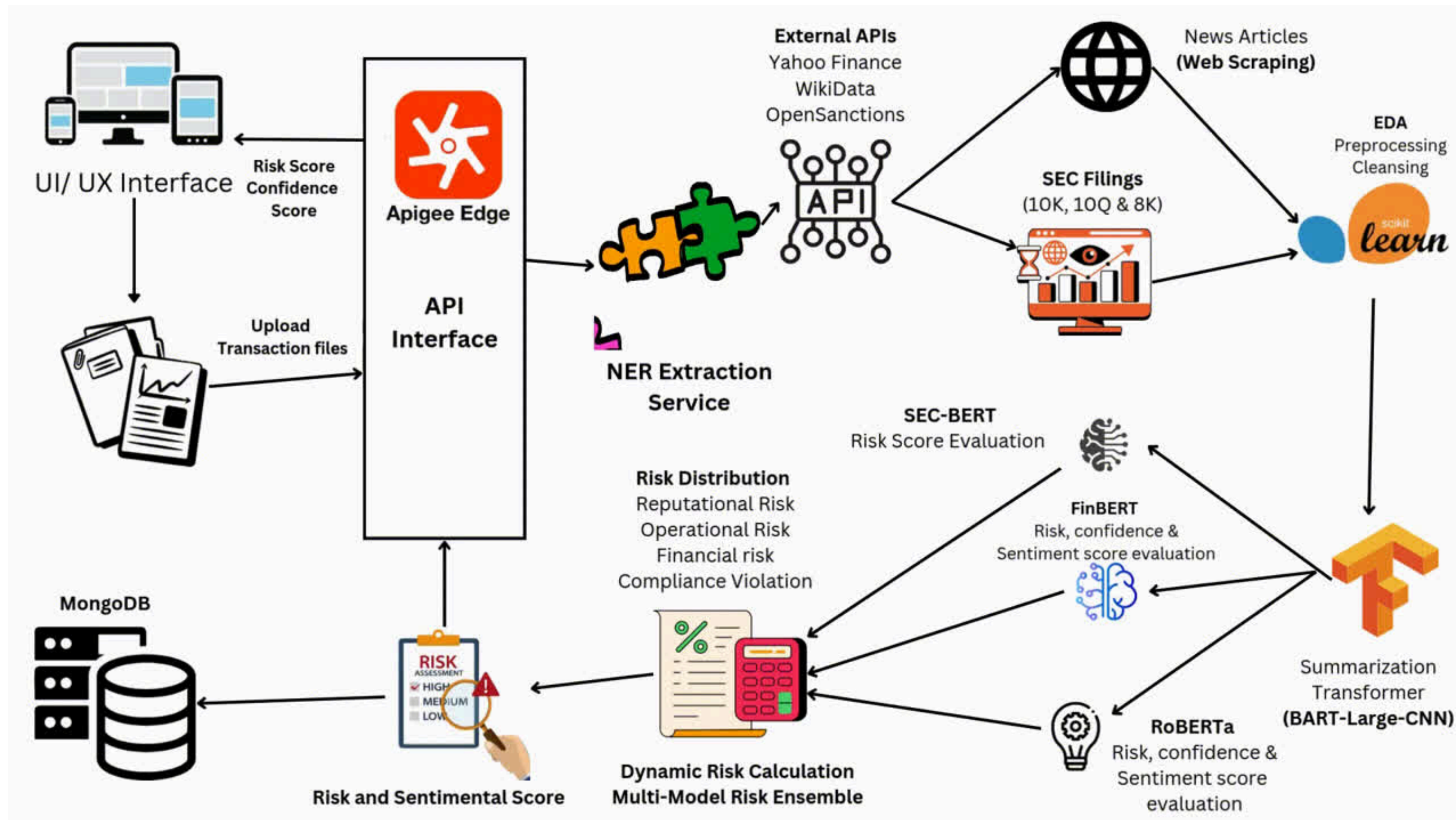
Close

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# System Workflow Diagram



**Thank you  
very much!**