CredTech Hackathon
Explainable Credit Intelligence Platform

Organized by The Programming Club, IITK
Powered by Deep Root Investments

Problem Statement

Registration Form Link: https://forms.gle/L6ob8Z1uMokxnmZy6
Submission Form Link: https://forms.gle/MDDpymgk9zWYvAdDA

Background

In global credit markets, billions of dollars move daily based on the perceived creditworthiness of companies and governments. These perceptions are largely shaped by traditional credit rating agencies, whose ratings are:

- Updated infrequently
- Based on opaque methodologies
- Often lagging behind real-world events

This creates mispricing opportunities: where the true risk is different from what the market believes.

Meanwhile, there's an explosion of high-frequency, heterogeneous public data from company filings and macroeconomic reports to commodity price movements, trade flows, and even alternative datasets like satellite imagery or shipping trackers. With developments in Artificial Intelligence, these signals can be fused into real-time, dynamically updated creditworthiness assessments.

The challenge: investors and regulators won't trust a score unless they understand why it was assigned. The "black box" has to be replaced with a transparent, explainable, evidence-backed system.

The Problem Statement

Build a **Real-Time Explainable Credit Intelligence Platform** that:

- Continuously ingests and processes multi-source financial, operational, macroeconomic, and **selected unstructured data**;

- Generates **issuer-level and asset-class-level creditworthiness scores** that react faster than traditional ratings;
- Produces **clear, feature-level explanations** and trend insights for each score;
- Presents results through an **interactive, analyst-friendly web dashboard.**

What You Will Build

1. **High-Throughput Data Ingestion & Processing**
    - **Sources (selected minimum 2 structured and 1 unstructured):**
        - <u>Structured:</u> SEC EDGAR, MCA filings, Yahoo Finance APIs, Alpha Vantage, World Bank/FRED, sector-specific indices, energy prices, shipping data, etc.
        - <u>Unstructured:</u> real-time news headlines, press releases, earnings call transcripts, or social media sentiment (only public/free data).
    - **Recommended features:**
        - Near-real-time or frequent updates
        - Cleaning, normalization, and feature extraction
        - Scalability for dozens of issuers across sectors
        - Fault tolerance for data source outages
2. **Adaptive Scoring Engine**
    - Assign creditworthiness scores (custom scale or standard);
    - You could use Interpretable models like and decision trees; or Black-box models with explainability layers;
    - The algorithm, if a trainable algorithm must handle incremental learning or frequent retraining
3. **Explainability Layer**
    - For each score:
        - Feature contribution breakdowns;
        - Trend indicators (short-term vs. long-term);
        - Reasoning highlighting latest events from both structured and unstructured sources;
        - Plain-language summaries for non-technical stakeholders.
    - We are not looking for LLM responses in the name of “explainability”. Any solution which prompts an LLM with the output of its model to provide the explanation of the output will not be considered a good solution.
4. **Interactive Analyst Dashboard**

- Interactive score trends over time
- Feature importance visualizations
- Filters
- **Bonus:**
    - Alerts for sudden score changes
    - Comparison with agency ratings

5. **End-to-End Deployment**
    - Fully hosted online (public demo)
    - Containerization (Docker) for reproducibility
    - Bonus: Integration of Automated data refresh & model retraining and other basic MLOps techniques

Unstructured Event Integration

To make your system truly **market-reactive**, it should detect and interpret real-world events from unstructured sources (e.g., financial news headlines, transcripts) and factor them into both:

- The creditworthiness score
- The explanation provided to the user

Examples:

- News: "Company X announces debt restructuring" → Score decreases due to higher perceived risk
- Transcript: "CEO warns of declining demand" → Early warning signal before quarterly results
- Social sentiment: Spike in negative mentions about a sovereign bond → Triggers review

You might want to consider the following while working on this feature:

- Natural Language Processing (NLP) for entity recognition and event classification
- Mapping events to risk factors in your scoring model
- Showing these events in the dashboard as part of the "Why this score?" explanation

Evaluation Focus

Note: The weightage provided in front of each solution component is not used for objective scoring, but to only provide the participants a brief idea about the importance of various components. Metrics for which no weightage is provided are general recommendations and things we'll look out for during evaluation. These are not “application components”, but “solution components” which are integral for the judges to be able to comprehensively evaluate the solution. Just because weightage is not provided for these components, it does not that they are unimportant.

Data Engineering & Pipeline (20%): Robust ingestion, processing, scalability, reproducibility. How do you deal with failures at each step and handle those errors? How do you reduce latency and optimize your model when the data inflow is extremely high? How do you choose your features and input sources?

Model Accuracy & Explainability (30%): How accurate are your model predictions? What kind of testing have you done in order to check the accuracy of your model? Is your testing strategy robust? Are the explanations being produced in line with your model output and input features?

Dealing with Unstructured Data (12.5%): How do you effectively and meaningfully use unstructured event data? How well do you integrate the signals from objective and subjective data? Does integration of unstructured data boost the accuracy or explainability of the model?

User Experience & Dashboard (15%): How intuitive is your dashboard? How well are you able to present useful data to an analyst to deliver insights?

Deployment, Ops and Real-time updates (10%): Have you deployed the application? Does the model get updated frequently? What is the frequency of the updates? What kinds of triggers are being used?

Innovation (12.5%): Unique features, creative data sources, creative visualizations.

Attention to detail: How do you ensure polish and accuracy across all aspects of your work - code correctness, error handling, edge-case coverage, tests, and documentation—so that no subtle issues slip through?

Code quality: How do you keep your code readable and modular, with meaningful names and minimal duplication?

System architecture: How well do you explain the basic system architecture concepts? Is your application architecture reasonable? What tech stack do you use and why was that specific selection made? How and where are you storing data? What's the distribution of client-side and server-side processes?

Trade-offs: Have you explained basic architectural decisions and why you rejected alternative approaches? Do you conduct a trade-off analysis between various possible alternatives? Do you try out and compare multiple approaches, and benchmark them against standard methods? (this along with the System Architecture should be highlighted in the repository README, presentation and/or video demonstration)

Deliverables

1. Code Repository (Github) with clear atomic commits and a README with instructions to run the code locally on various setups, explanation of core features, system architecture, key tradeoffs and model comparisons: Keep the repository private till 2359 hrs IST, 22nd August 2025;
2. Public URL where your app is deployed;
3. A presentation deck in PDF or PPT format (max 100 MB for uploading);
4. Short Video walk through (5 - 7 minutes) demonstrating:
    a. Key features that you implemented
    b. End-to-end product demonstration
    c. Brief explanation of the technical implementation (Frontend + Backend + Business Logic)

Award Structure

- 1st Position: INR 50,000
- 2nd Position: INR 25,000
- 3rd Position: INR 15,000