Byteathon Problem Statement

Problem Statement ID: BYT01

Problem Statement Title: Identifying and Tracing Coordinated Money-Laundering Networks Across Financial Institutions Using Transactional and Temporal Patterns

Theme: FinTech / Graph Intelligence

Short Description: Build an interactive forensic web platform that ingests raw banking transaction logs to uncover coordinated money-laundering operations. The system must map fund flows into a directed temporal graph, filter out benign high-volume commerce, and isolate circular wash routes, rapid pass-through mule chains, and smurfing rings (splitting large sums into micro-deposits). The final deliverable must feature an investigator dashboard that renders interactive subgraphs of flagged accounts, highlights transaction velocity metrics, and exports audit-ready compliance dossiers.

Problem Statement ID: BYT02

Problem Statement Title: Reconstructing Longitudinal Disease Progression and Identifying Early Signs of Patient Deterioration from Fragmented Clinical Records

Theme: MedTech / Healthcare AI

Short Description: Develop a clinical intelligence portal that ingests fragmented, multi-visit electronic health records (EHR)—including unstructured physician notes, periodic lab panels, and vitals history. The software must resolve temporal gaps, extract timeline event markers, and infer latent chronic disease trajectories (such as progressive renal decline or sepsis risk) before critical acute onset. The application must provide clinicians with an interactive visual timeline of patient disease milestones, uncertainty confidence intervals, and automated alerts for conflicting medication or lab indicators.

Problem Statement ID: BYT03

Problem Statement Title: Identifying Hidden Programming Misconceptions from Student Coding and Debugging Behavior to Enable Adaptive, Personalized Learning

Theme: EdTech / Cognitive Systems

Short Description: Create an intelligent pedagogical coding sandbox that analyzes student programming submissions, compiler error logs, and iterative debugging behavior to pinpoint fundamental conceptual gaps. Rather than providing direct code solutions, the system must build an underlying learner knowledge graph, identify logic misconceptions (such as variable scoping bugs or pointer misuse), and dynamically generate progressive Socratic hints and tailored micro-challenges. The platform must display a learner mastery dashboard mapping conceptual bottlenecks alongside real-time hint interaction logs.

Problem Statement ID: BYT04

Problem Statement Title: Reconstructing Multi-Stage Cyberattacks and Anticipating Lateral Movement by Correlating Fragmented Security Telemetry Across Networked Systems

Theme: Cybersecurity / Digital Forensics

Short Description: Engineer a Security Operations Center (SOC) analytics tool that ingests raw system telemetry, including authentication logs, DNS requests, and endpoint process trees. The system must correlate disconnected alerts across separate network machines, reconstruct the complete multi-stage MITRE ATT&CK kill-chain, and flag lateral movement in progress. The solution must provide incident responders with an interactive visual incident graph showing compromised hosts, identified root-cause entry points, and an automated prediction of likely next-target assets.

Problem Statement ID: BYT05

Problem Statement Title: Predicting Cascading Failures Across Interconnected Urban Infrastructure and Optimizing Emergency Interventions Under Disruptive Conditions

Theme: Smart Cities / Climate Resilience

Short Description: Build a geospatial simulation and decision-support dashboard that models systemic interdependencies across municipal utilities (power grids, water pumping mains, transit corridors, and emergency hospitals). Ingesting simulated environmental shock data (such as localized flood depths or substation outages), the engine must compute failure-propagation cascades across connected networks, identify critical single points of failure, and calculate optimal emergency intervention sequences that minimize total urban disruption.