Process Mining Virtual Internship

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(Affiliated to JNTUA & Approved by AICTE) (Accredited by NAAC with 'A' Grade & Accredited by NBA (EEE, ECE & CSE)
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Course Objective

- **The goal of the process mining course is to educate students in the skills of examining and enhancing business processes through the utilization of data derived from diverse information systems.**

- **Through these internships, participants can employ their process mining skills on actual or simulated datasets, unlocking practical insights into the art of enhancing business processes.**

Introduction

- What is Process Mining??
  - What is Process?
    - Process refers to a series of planned steps or actions performed in a specific order to achieve a particular result or goal.
  - What is Mining?
    - Mining means extracting valuable things from a place or data source.
- Process mining is a technique that involves extracting, analyzing, and visualizing data from various information systems to gain insights into how business processes are actually executed. It aims to uncover the actual workflow, deviations, bottlenecks, and inefficiencies within processes by using real-world data. This information is then used to improve processes, enhance efficiency, and make informed decisions for optimizing business operations. Process mining combines elements from data mining, machine learning, and process management to provide a comprehensive understanding of how processes work in practice.

Introduction

- We have done this internship under Eduskills in association with AICTE.
- Eduskills is a Non-profit organization which enables Industry 4.0 ready digital workforce in India.
- They are associated with 50 plus colleges and thousands of students registered in this platform. They are associated with govt.bodies like ESTD,ISTE,IETE.
- The process mining was done in the platform of Celonis website, it helps companies achieve process excellence through its platform by eliminating operational friction with their Intelligent Business Cloud platform
- The Celonis EMS helps you not just understand your processes, but to run your entire business on data and intelligence. It provides capabilities for Real-Time Data Ingestion, Process and Task Mining, Planning and Simulation, Visual and Daily Management, and Action Flows.
- Celonis is an American-German data processing company that offers software as a service (SaaS) to improve business processes

Introduction

➢Process Mining is combination of two disciplines: Datascience and Management Science.

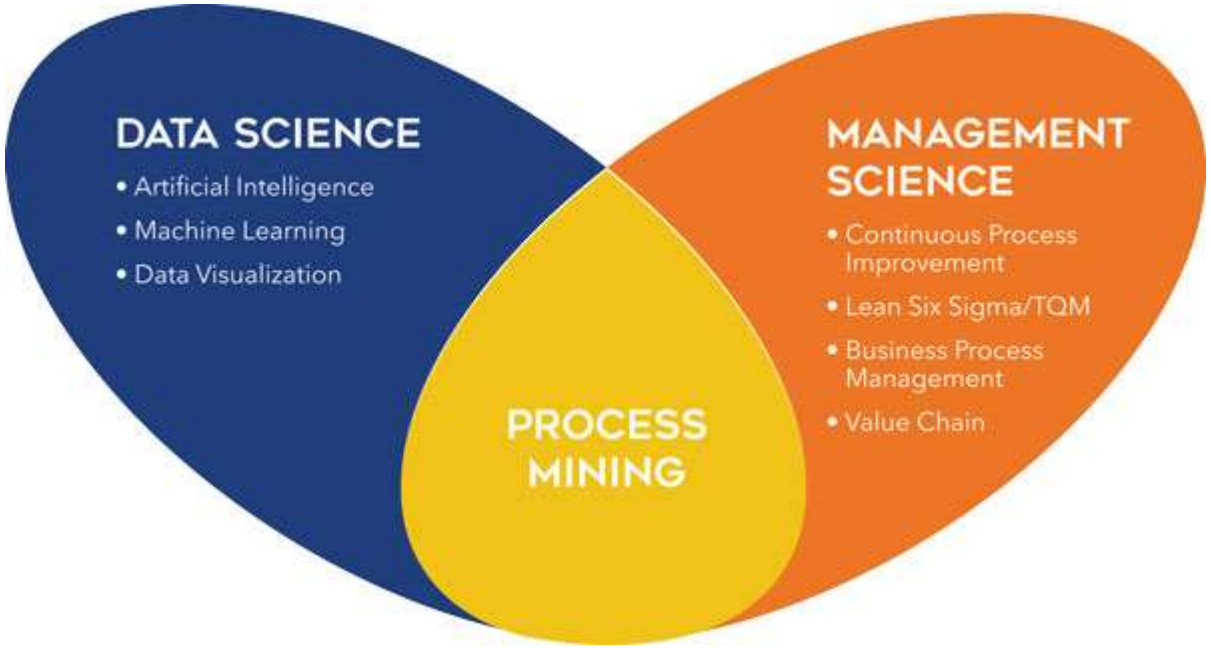

Fig.1: Process Mining Model

Technology

- Process mining involves technologies such as data extraction, event log collection, and process discovery algorithms to analyze business processes. Conformance checking tools compare discovered models with real data, and enhancement techniques use machine learning for optimization. Data visualization tools represent insights, while AI aids in anomaly detection. Real-time monitoring, simulation, and cloud computing also play roles in process mining.
- Imagine a pizza delivery business wants to improve its delivery process:
- **1. Data Collection:** They gather data on order timestamps, delivery routes, and driver activities
- **2. Event Logs:** Event logs track order placement, preparation, driver assignment, and delivery.
- **3.Process Model:** Process mining creates a visual map of how orders move from kitchen to customers.
- **4.Identifying Delays:** By comparing the model with real data, they find places where orders often get delayed.
- **5. Efficiency Boost:** They adjust routes and kitchen processes based on data to speed up deliveries.
- **6. Future Planning:** Using historical data, they predict busy hours and allocate more drivers.

Result: Quicker pizza deliveries, happier customers, and better business efficiency.

Applications

- **Software engineering:** Process mining can help monitor and control software development processes, and identify problems and bottlenecks.

- **Process optimization**: Process mining can help reduce costs, improve customer experience, ensure compliance, and find areas of automation.

- **Process comparison:** Process mining can help compare different processes or variants of the same process, and measure their performance and efficiency.

Applications

- **Business Process Improvement:** Process mining is a solution for the financial services sector, which faces increased regulatory and audit requirements due to the digitization of more industries and the rise in transaction volume. Process mining allows companies to continuously and comprehensively detect problems within high-volume processes that are difficult to identify using manual methods.

- **Health Care :** Healthcare organizations face the challenge of delivering effective and high-quality end-to-end patient journeys, from the first doctor appointment to the closed treatment cases, as data about patient experiences and outcomes keep growing. Process mining helps them overcome this challenge by supporting them to achieve their population health and individual patient journey goals.

Modules

- Celonis Process Mining Fundamentals
- Write PQL Queries
- Get data into EMS

Process Mining Fundamentals

- Process mining is a set of techniques used for obtaining knowledge and extracting insights from processby the means of analyzing the event data, generated during the execution of the process.
- This training track provides both the theoretical and applied foundations around Process Mining.
- Process mining reads this data, converts it into an event log, and then creates visualizations of the end-to-end process, along with insightful analytics.
- An event log contains each step performed during the process (the activity), the time at which the event occurred (the timestamp), and for which instance of the process (the case ID).
- Using this event log, algorithms generate a process model that shows the process as it really is including the timing of each step and all variations

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- Main Stages in Process Mining:
  - Activity or interaction.
  - Event Log.
  - Visualized.
  - Process Analytics.

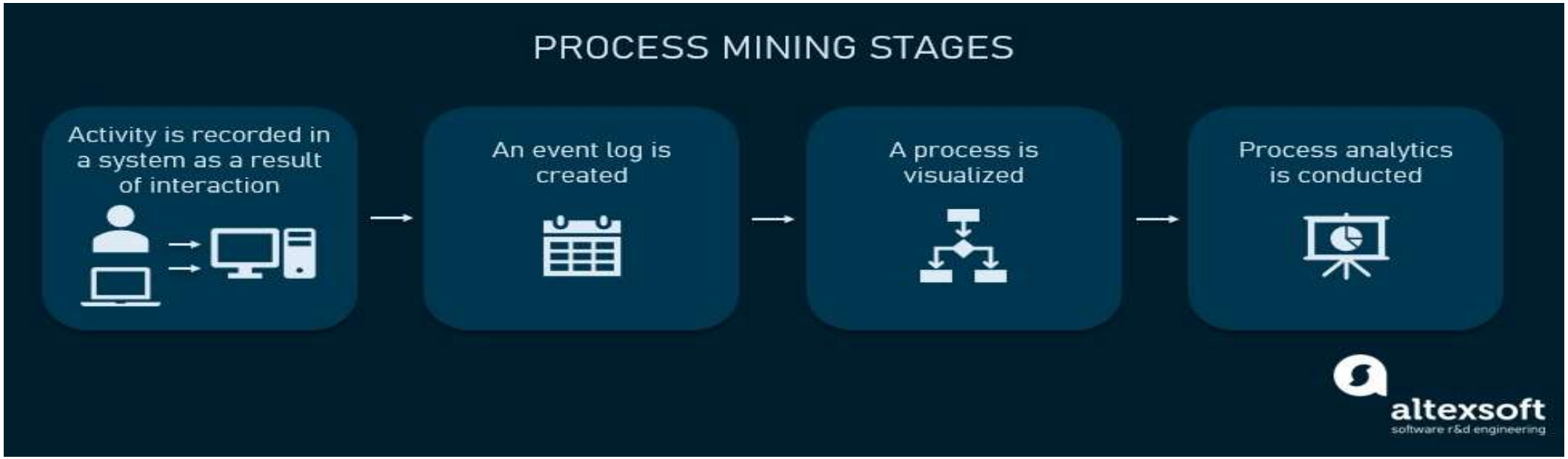

Fig2: Process Mining Stages

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Celonis Analysis

Navigate to an analysis

Use the variant explorer

Use the process explorer

Use charts and tables

Use selection views

Use the case explorer

Use the conformance checker

Save & share analysis selection

Get to know celonis analysis

- Once you start interacting with a Celonis Analysis to identify process inefficiencies, you'll see that three core concepts repeatedly come up: process, activity, and case.

- A process is a series of linked steps taken in order to achieve a particular goal.
- An activity is a step that occurs in the process. Process activities are actions that initiate or terminate a process or take place during it. Each activity consists of one or more tasks that together are a milestone in the process.
- A case is an “item” or “object” you follow through the process.

Navigate to an analysis

- **1. Define Goal:** Clearly outline your analysis objective, like understanding a process or identifying bottlenecks.
- **2. Collect Data:** Gather event logs capturing process activities and sequences.
- **3. Visualize Process:** Use process mining tools to create visual maps of how the process unfolds.
- **4. Analyze Performance**: Identify patterns, delays, and inefficiencies within the process.
- **5. Optimize and Implement:** Based on insights, make improvements to enhance efficiency and address issues.

Use the variant explorer

- **1. Access Tool:** Open your process mining software and locate the Variant Explorer feature.
- **2. Data Selection:** Choose the relevant event log data to analyze.
- **3.Visualize Variants:** Use the Variant Explorer to see different paths and variations in your process.
- **4. Pattern Recognition:** Identify recurring patterns, bottlenecks, and unique process instances.
- **5. Informed Decisions:** Gain insights into process dynamics and make informed decisions for process improvement based on the observed variants.

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- **Process Explorer in Process Mining:**
  - The Process Explorer is a visual tool in process mining that shows how a business process works. It helps identify slowdowns and problems in the process. By zooming in on steps, you can understand how things are done. This tool is like a map for processes, helping make them smoother and more efficient.

- **Using Charts and Tables in Process Mining:**
  - Charts and tables simplify complex data in process mining. Charts visually show step durations and frequencies, while tables organize patterns. They're vital for spotting process inefficiencies and making targeted improvements, ensuring processes run smoother.

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➢Using Selection Views in Process Mining:

❑Selection Views are a handy feature in process mining that allow you to focus on specific parts of a process. They act like filters, letting you zoom in on particular activities, time frames, or cases. By using Selection Views, you can spot patterns and issues in detail. It's like using a magnifying glass to understand important parts of a bigger picture. This feature helps you dig deep into your data to find insights and make processes work better.

➢Using the Case Explorer in Process Mining:

❑The Case Explorer is a key tool in process mining that lets you dive deep into individual cases or instances of a process. By selecting a specific case, you can see exactly how it moved through the process steps. This helps you find deviations, bottlenecks, and improvements at a granular level, offering precise insights for optimizing processes.

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- **Using Case Explorer in Process Mining:**
  - The Case Explorer is a feature in process mining that focuses on individual cases. It helps you dive deep into each case, seeing exactly how steps are taken. This way, you can spot variations, delays, and even track unique instances, which is like studying each page of a story to understand the whole plot.
- **Using the Conformance Checker in Process Mining:**
  - The Conformance Checker is a tool in process mining that compares how a process should ideally work with how it actually happens. By analyzing real data, it points out where deviations or errors occur, helping improve processes for better efficiency.
- **Save & Share Analysis Selection:**
  - "Save & Share Analysis Selection“,Lets you store and distribute specific analyses you've conducted. This feature is like bookmarking insights, allowing you to revisit or share them with others later. It simplifies collaboration and ensures valuable findings aren't lost.

PQL Queries

➢Write PQL Queries:

❑**PQL Queries in Process Mining :** PQL (Process Query Language) queries are like asking questions about how a process works. They help process mining tools dig into data and find specific information. It's a way to understand the details of processes and find areas to improve for better efficiency.

➢How PQL Queries are used ?

1. **Frequency of Activities:** Query to find how often specific activities occur in the process, helping identify common and rare tasks.
2. **Time Between Activities:** Measure the time taken between two specific activities, revealing bottlenecks or delays in the process.
3. **Variants Analysis:** Analyze process variations by querying for different paths that cases take, offering insights into process complexity.
4. **Case Duration:** Determine how long it takes for a case to complete the entire process, aiding in assessing efficiency.
5. **Performance Comparison:** Compare process performance between different groups, departments, or time periods using PQL queries to identify disparities and opportunities for improvement.

The Celonis PQL Engine

➢ **The Celonis PQL Engine:**

❑ The Celonis Process Query Language (PQL) Engine is a vital part of process mining. It allows you to ask questions about your business processes and get answers directly from your data. PQL makes it easier to explore, analyze, and understand process performance for smarter decisions.

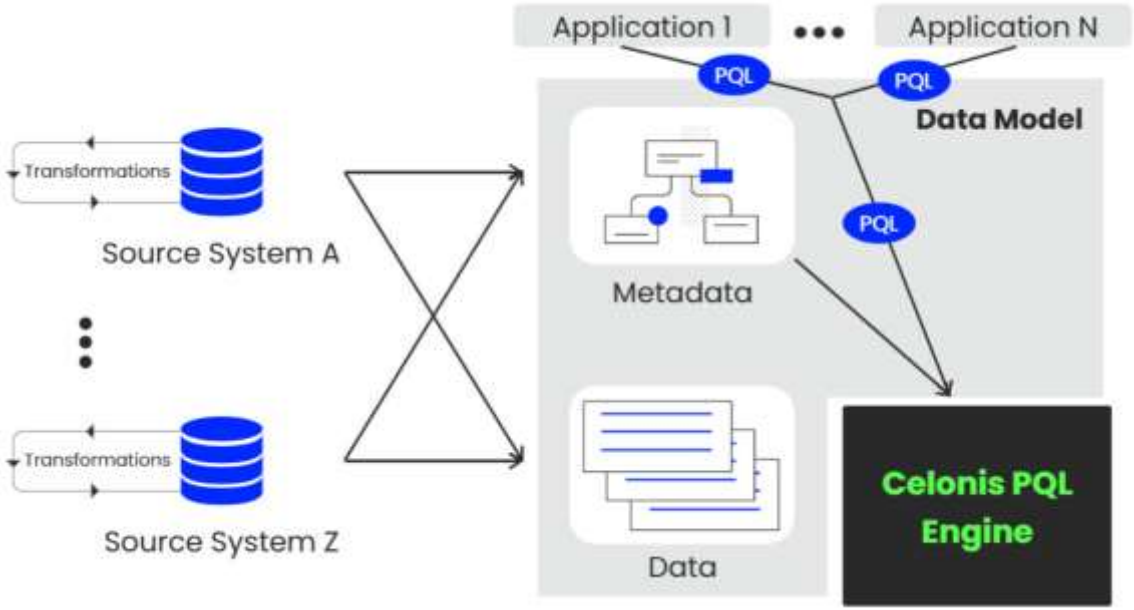

Fig.3: Celonis PQL Engine

Get data into EMS

- Getting data into an Event Management System (EMS) for process mining involves a few key steps:
- **1.Data Source Identification:** Identify the systems and sources where event data is generated, such as ERP, CRM, or IoT devices.
- **2.Data Extraction:** Extract event data from the identified sources. This might involve querying databases, using APIs, or integrating with data connectors.
- **3.Data Transformation:** Format the extracted data to match the required structure for process mining. This might include standardizing timestamps, categorizing events, and ensuring data consistency.
- **4.Data Cleansing:** Cleanse the data to remove inconsistencies, errors, and duplicates that could affect the accuracy of process mining results.
- **5.Data Integration:** Integrate data from different sources into a unified event log, ensuring that the data aligns chronologically.
- **6.Event Log Storage:** Store the cleaned and integrated event log in a suitable storage system, which could be a relational database, a data warehouse, or a big data platform.
- **7.Data Preprocessing:** Perform any required preprocessing steps, such as enriching the data with additional context or attributes that might be useful for analysis.

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- **8.Event Log Enrichment:** Enhance the event log with relevant metadata and contextual information, which can provide a clearer understanding of the events.
- **9.Quality Assurance:** Validate the event log to ensure that it accurately represents the real-world processes and that all necessary data has been correctly captured.
- **10.Data Privacy and Security:** Apply appropriate measures to safeguard sensitive data and ensure compliance with privacy regulations.
- **11.Data Upload to EMS:** Upload the prepared event log into the Event Management System (EMS) or process mining tool that you're using for analysis.
- **12.Data Mapping:** Map the event attributes to the fields recognized by the EMS to ensure proper interpretation.
- **13.Validation and Testing:** Validate that the uploaded data appears correctly in the EMS and performs preliminary tests to ensure the correctness of data mapping and interpretation.
- **14.Visualization and Analysis:** Use the EMS or process mining tool to visualize, analyze, and derive insights from the uploaded event data.

By following these steps, you can effectively bring event data into an EMS for process mining and unlock valuable insights into your business processes.

Real Time applications

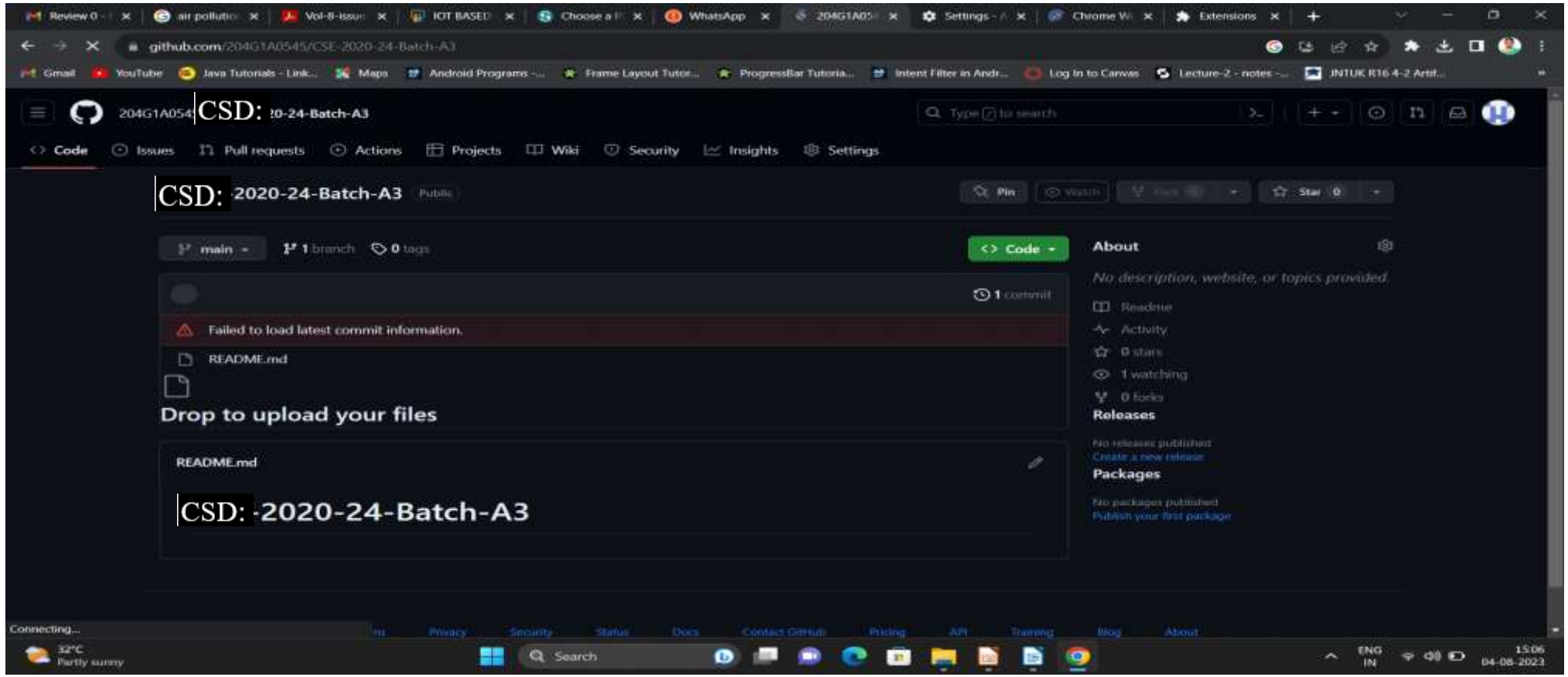
- **1.Real-Time Monitoring and Alerts:** Detect deviations from expected process flow in real time. Trigger immediate alerts for timely issue resolution. Maintain compliance and reduce disruptions.
- **2.Dynamic Workflow Optimization:** Identify bottlenecks and reroute tasks in real time. Optimize resource allocation based on current demand. Enhance efficiency and reduce lead times.
- **3.Fraud Detection and Prevention:** Monitor transactions for anomalies as they occur. Automatically flag suspicious activities in real time. Mitigate financial losses and adapt to new fraud patterns.

These applications leverage real-time process mining for swift insights and actions, improving operations and risk management.

Learning outcomes

- ✓**Know How Things Work:** Understand real processes and how they happen.
- ✓**Play with Data:** Clean and look at data to find useful things.
- ✓**Make Things Better:** Find problems and make processes work smoother.
- ✓**Decide Smartly:** Use data to choose the best ways to improve.
- ✓**Keep Getting Better:** Always find ways to make things work even nicer.

Git Hub Dashboard



- Repository Name Like: Summer Internship I
- Under that include document, presentation and Certificate(Pdf).

Any Queries?

Thank You!!!