

An Internship Report

on

Process Mining Virtual Internship

Submitted in partial fulfilment of the requirements

for the award of the degree of

BACHELOR OF TECHNOLOGY

in

Computer Science and Engineering (Data Science)

by

N. Bhavana

214G1A3207



**DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING
(DATA SCIENCE)**

**SRINIVASA RAMANUJAN INSTITUTE OF TECHNOLOGY
(AUTONOMOUS)**

(Affiliated to JNTUA, accredited by NAAC with 'A' Grade, Approved by AICTE,
New Delhi & Accredited by NBA (EEE, ECE & CSE))
Rotarypuram village, B K Samudram Mandal, Ananthapuramu-515701.

2023 – 2024

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Certificate

This is to certify that the internship report entitled “**Process Mining Virtual Internship**” is the bonafide work carried out by **N. Bhavana** bearing Roll Number **214G1A3207** in partial fulfilment of the requirements for the award of the degree of **Bachelor of Technology** in **Computer Science and Engineering (Data Science)** for <<four months from June 2023 to September 2023.>>

Internship Coordinator

Mr. P. Veera Prakash, M. Tech., (Ph.D.),
Assistant Professor & HOD of CSE

Head of the Department

Dr. P. Chitralingappa, M. Tech., Ph.D.,
Associate Professor

Date:

Place: Ananthapuramu

EXTERNAL EXAMINER

PREFACE

I did this Internship from technology, June 2023 to September 2023 with the help of this are compared with real workflows theory, which leads to better transparency as well as insight into the processes. This is necessary because the reality of the processes usually does not correspond to the ideas of the process participants and the work steps in the reality are usually much more complex. This internship project is a part of III - Year B. Tech program which is conducted at Srinivasa Ramanujan Institute of Technology - Ananthapuramu.

AICTE has prepared a model curriculum with the help of prominent Academicians of the country so the country may produce competent employable graduates as per the needs of the industries. One of the best academicians in the India is Eduskills as for the AICTE curriculum they provided. 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.

ACKNOWLEDGEMENT

The satisfaction and euphoria that accompany the successful completion of any task would be incomplete without the mention of people who made it possible, whose constant guidance and encouragement crowned our efforts with success. It is a pleasant aspect that I have now the opportunity to express my gratitude for all of them.

It is with immense pleasure that I would like to express my indebted gratitude to my internship coordinator **Mr. P. Veera Prakash, Assistant Professor & HOD, Department of Computer Science and Engineering**, who has supported me a lot and encouraged me in every step of the internship work. I thank him for the stimulating support, constant encouragement and constructive criticism which have made possible to bring out this internship work.

I am very much thankful to **Dr. P. Chitralingappa, Associate Professor & HOD, Computer Science and Engineering (Data Science)**, for his kind support and for providing necessary facilities to carry out the work.

I wish to convey my special thanks to **Dr. G. Balakrishna, Principal of Srinivasa Ramanujan Institute of Technology** for giving the required information in doing my internship. Not to forget, I thank all other faculty and non-teaching staff, and my friends who had directly or indirectly helped and supported me in completing my internship in time.

I also express our sincere thanks to the Management for providing excellent facilities and support.

Finally, I wish to convey my gratitude to my family who fostered all the requirements and facilities that I need.

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CHAPTER 1

INTRODUCTION

which leads to better transparency as well as insight into the processes. This is necessary because the reality of the processes usually does not correspond to the ideas of the processes usually does not correspond to the ideas of the process participants and the work steps in reality are usually much more complex. You can imagine this like the promo pictures of empty vacation beaches, which are then totally overcrowded in reality. process mining is a process management technique. It aims to discover and monitor and improve process flows by extracting readily available knowledge from information systems event logs. Process mining provides companies with complete visibility into how processes really work.

1.1 Modules

1.1.1 Process Mining:

In this module we learned how to:

- Data transformation
- Data analysis
- Continuous monitoring

1.1.2 Process Mining (Cloud):

In this module we learned how to:

- App templates
- Extracting and loading data

1.1.3 Processes Mining transparency:

In this module we learned how to:

- Automation Process Discovery
- Conformity Check
- Organization Mining

1.1.4 Process Mining is the MRI for processes:

In this module we learned how to:

- MRI Technology
- Risk of Confusion

1.1.5 Mining Algorithm:

In this module we learned how to:

- Deterministic Algorithm
- Heuristic Algorithm
- Genetic Algorithm

1.1.6 Starting a Project in mining:

In this module we learned how to:

- Determining problem
- Defining the Data
- Pilot Project
- Accepting Truth

1.1.7 Industrial Usage of Mining:

In this module we learned how to:

- Production
- Financing
- Telecom

1.1.8 Process Mining Software's:

In this module we learned how to:

- Process Detection
- Conformity Testing
- Performance Analysis

1.1.9 Software Key Functions

In this module we learned how to:

- Identifications
- Optimization

1.1.10 Process Mining Software Providers

In this module we learned how to:

- Different Software Provider

CHAPTER 2

TECHNOLOGY

2.1 Process Mining Technologies:

Process mining applies data science to discover, validate and improve work flow. By combining data mining and process analytics, organizations can mine log data from their information systems to understand the performance their processes, revealing bottlenecks and other areas of improvement.

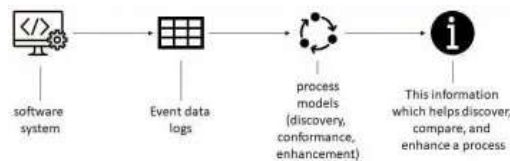


Fig. 1.1: Process Mining Technology

1.App templates:

With **Process Mining** Service Automation Cloud, you can create a new process apps based on process-specific app templates. An app template contains a predefined set of dashboards and KPIs for process analysis and can be used as the starting point for creating your process apps. If available, app template can include a built-in connect for a specific combination of a process and source system.

2. Extracting and loading data:

When creating a process app, you can upload data from .csv or .tsv files, or you can set up a connection to a source system using the extraction tools CData Sync or Theobald Xtract Universal. You can also use DataBridgeAgent to use custom mvp connectors to upload data from your source system.

3.Editing data transformations:

Transformation are applied to the data stored in the database to make sure the data adheres to a data schema which can be loaded in the Process Mining process app. In Process Mining, you can customize the transformations to adapt them to your data schema.

4.Customizing process apps:

- **Dashboard editor:** After creating a process app from an app template, you can edit the dashboards to customize the process app to your business needs. The Dashboard provides various options to create different views, and to organize, group, and filter data.

- **Data Manager:** The Data Manager enables you to customize the data used in your process app. With Data Manager you can edit data fields and metrics to change the display names used in your app. Besides, you can toggle fields to be visible or not.

5.Root cause analysis:

With Root cause analysis, you can compare the influence of case properties on a certain behavior to find significant data influencers for specific process situations. A set of cases is defined based on the period filter. This selection is called reference cases. Within this set of cases, you can select the behavior that you want to analyze.

6.Managing access control for process apps:

The Admin Console module enables you to manage access by assigning roles to users or groups. The permissions model allows you to integrate all your employees using Process Mining based on your business requirements.

CHAPTER 3

APPLICATIONS

Process mining applies data science to discover, validate and improve workflows. By combining data mining and process analytics, organizations can mine log data from their information systems to understand the performance of their process, revealing bottlenecks and other areas of improvement. Process mining is beneficial for many situations in large organizations. Areas where process mining organizations. Area where process mining can be actively applied include the following.

- Automation this is about understanding the actual processes, variations and opportunities to be successful in RPA projects.
- The reporting of complete process KPIs and dashboards for a given process.
- The Digital Transformation to understand the "big picture" - how businesses operate, what needs to be prioritized and transformed.
- Scaling optimization efforts across multiple business operations and locations and supporting process control through the use of Data.
- Capture processes anywhere in the enterprise with little human effort.
- Identify bottlenecks, deviations, and inefficient processes to be reconsidered or automated.
- Continuous monitoring and measurement of improvements.
- Simplify compliance, with complete audit trails.
- Delivering the full context and end-to-end perspective required for process improvements.
- Identify the most valuable and effective processes for using automation.

CHAPTER 4

MODULES

4.1: Process Mining:

Process mining applies data science to discover, validate and improve workflows. By combining data mining and process analytics, organizations can mine log data from their information systems to understand the performance of their processes, revealing bottlenecks and other areas of improvement. Process mining leverages a data-driven approach to process optimization, allowing managers remain objective in their decision-making around resource allocation for existing processes. Process mining focuses on different perspectives, such as control-flow, organizational, case, and time. While much of the work around process mining focuses on the sequence of activities — i.e. control-flow — the other perspectives also provide valuable information for management teams.

4.2: Process Mining Cloud:

With the Process Mining service in Automation Cloud, you can create new process apps based on process-specific app templates. An app template contains a predefined set of dashboards and KPIs for process analysis and can be used as the starting point for creating your process apps. If available, an app template can include a built-in connector for a specific combination of a process and source system. It offers out-of-the box app templates for several processes and source systems that you can use as the starting point for creating your process apps. You can customize these app templates to your business needs and publish them with a set of dashboards and KPIs to enable business users to monitor and analyze the processes in detail. When creating a process app, you can upload data from .csv or .tsv files, or you can set up a connection to a source system using the extraction tools CData Sync or Theobald Xtract Universal. You can also use DataBridgeAgent to use custom. mvp connectors to upload data from your source system.

4.3: Processes Mining Transparency:

Process mining is a process management technique. It aims to discover, monitor and improve process flows by extracting readily available knowledge information systems event logs. Process mining provides companies with complete visibility into how processes really work. With these insights, companies can then identify opportunities for process optimization. Process mining involves several steps.

- **The automated process discovery-** extraction of process models from an event log.
- **The conformity check-** monitoring deviations by comparing model and protocol.

4.4: Process Mining is the MRI for processes:

Process mining technology could also be compared to magnetic resonance imaging (MRI) technology, which collects information from the body's cells to create an image – only in a business environment. Doctors then use this MRI image to diagnose health conditions. Process mining works on a similar principle: It collects data from the smallest part of process activities and assembles it into a picture that companies can use to diagnose the state of their workflows.

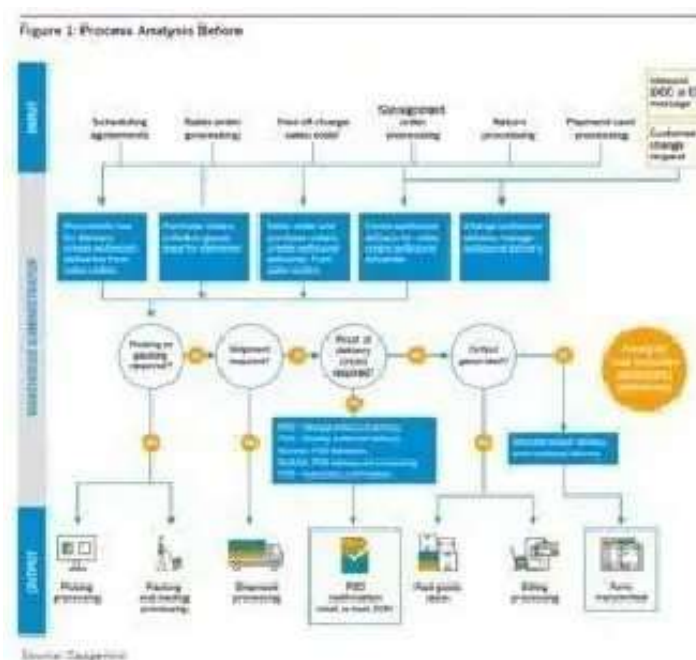


Fig. 1.2: Process Mining MRI

4.5: Mining Algorithms:

The mining algorithm determines how process models are created. The best-known categories are:

4.5.1 Deterministic algorithms: Determinism means that an algorithm produces only defined and responsible results. It always delivers the same result for the same input. The deterministic

algorithm was one of the first algorithms capable of handling concurrency. It takes an event log as input and computes the order relation of the events contained in the log.

4.5.2 Heuristic Algorithms: Heuristic mining also uses deterministic algorithms. However, they refer to the frequency of events and traces to reconstruct a process Model. A common problem in process mining is that real-world processes are very complex and their discovery leads to complex models. This complexity can be reduced by neglecting rare paths in the models.

4.5.3 Genetic Algorithms: They use an evolutionary approach that mimics the process of natural evolution. They are not deterministic. Genetic mining algorithms follow four steps: Initialization, Selection, Reproduction, and Termination.

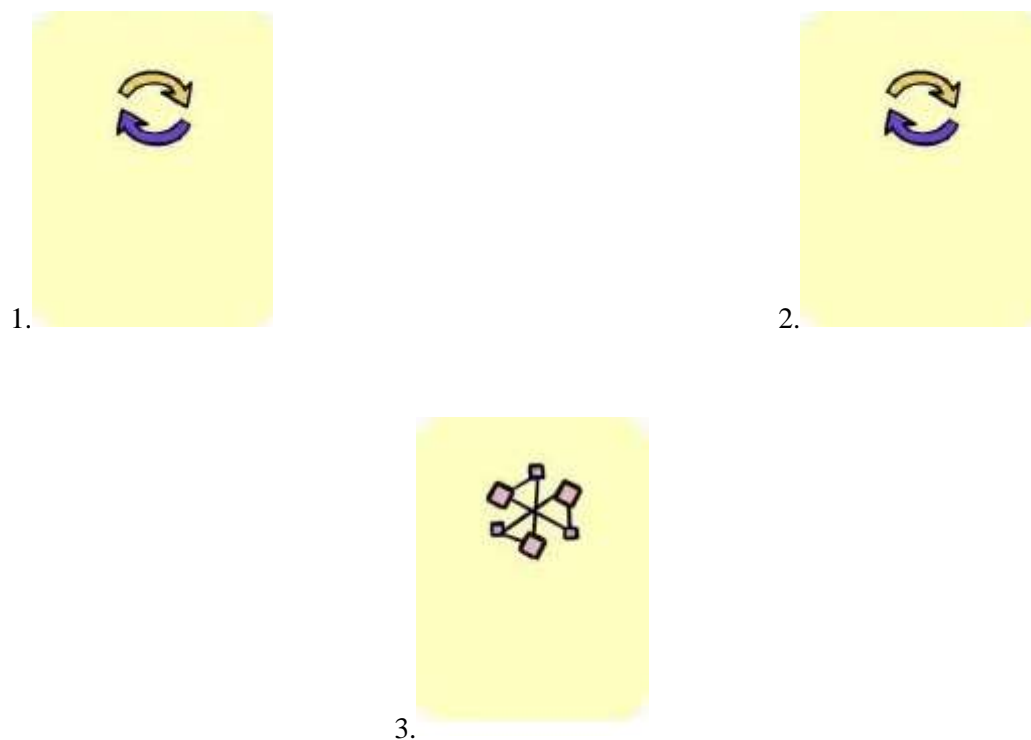


Fig. 2.1: Mining Algorithms

4.6 Starting Project in Mining:

To start a project in the stream of process mining one need to follow Some basic requirements they are classified as follows.

4.6.1 Determine Problem: Identify the problem of importance to the business that can realistically be addressed with process mining.

4.6.2 Identify the Data: Identify the data sources that need to be fully understood to address the business process issues under consideration.

4.6.3 Setting Pilot Project: Set up a pilot project to prove the potential value of a process mining solution. **Accept Truth:** Accepting the results of the analysis, as process mining provides, among other things, a clear picture based on facts.

4.6.4 Accept Truth: Accepting the results of the analysis, as process mining providers, among other things, a clear picture based on facts



Fig. 2.2: Mining Project

4.7: Industrial Usage of Mining

4.7.1: Production

In the manufacturing industry, timely and accurate delivery to a customer is the goal. When a company has multiple factories in different regions, there are usually differences between the reliability of deliveries. It is fairly easy to see that they exist, but it is more difficult to understand exactly where or why they are happening. Process mining can be used to compare the performance of different locations, down to individual process steps, including duration, cost, and the person performing the step. All event data available in the systems is suitable for use. In this way, facts can be generated.

4.7.2: Banking and finance:

In the financial sector, it is important to comply with rules and regulations and to be able to provide evidence of this. By using the event data from the systems, individual cases can also be visualized as a process flow.

4.7.3: Telecommunication:

Telecommunications is a highly competitive sector worldwide. The ability to improve operational processes is key to success and profitability. Process mining helps telecom companies gain visibility into geographically dispersed operations, identify bottlenecks, and ensure that customers receive products and services on time.



Fig. 3.1: Industrial usage of mining

4.7.4: Process Mining Software's:

A process mining solution should have strong detection capabilities. It should be able to search event logs to track what employees are actually doing and then create an appropriate process model by generating process maps of the entire business flow. In addition, the solution should have robust conformance checking that analyses event logs to ensure that actions match process models. Third, a process mining solution needs performance analysis and improvement capabilities that analyze potential inefficiencies within an event log to determine if and how they can be improved, and then make improvements based on real process data.

4.8: Process Mining Software Key Functions:

If your selected process mining software fulfills these key functions, then you have already made a good choice. However, you should always keep in mind that your company's ability to measure, monitor and optimize business processes has a direct impact on revenue and customer satisfaction. Therefore, it is important to choose the right process mining solution wisely to ensure that all business goals are optimally met. If necessary, an expert can also be consulted. Identify bottlenecks & process optimization opportunities provide insights into failed process steps. Ensure end-to-end view of the entire process monitor performance indicators in real time perform data cleansing compliance analysis & gap analysis provide continuous business process monitoring in real time improve process model.

4.9: Process Mining Software Providers:

The following are the Process Mining Software Providers in the Market



Fig. 3.2: Software Providers

CHAPTER 5

PROCESS MINING TOOLS AND SOFTWARE

5.1 Process Mining Tools:

Both process and task mining are thriving sectors of enterprise software with an increasing number of different vendors offering unique solutions. Let's go through some of the popular options and top tips.



Fig. 4.1: process mining tools and software

1. Workfellow Process Intelligence:

Workfellow is one of the newest process intelligence solutions offering advanced process mining functionality. Unlike traditional process mining software, it does not require access to enterprise system event logs - rather it collects process insights straight from the user interface using generative AI event log technology. Workfellow works with enterprise companies across different industries but is especially focused on knowledge-intensive digital work, such as financial operations, insurance and banking. For more information, read case-study how one medium-sized business process outsourcing (BPO) firm uncovered over € 2 million (\$2.17 million) in process waste.

2. Celonis Process Mining:

If you've heard of process mining you've probably heard of Celonis. Founded in 2011, Celonis was one of the first commercially available solutions on the market offering a full range of process discovery, analytics, conformance checking and process improvement solutions. As of today, Celonis has raised over \$2,3 Billion in investment funding, most recently in August 2022 from the Qatar Wealth Fund. The Celonis process mining platform is called the Execution Management System (EMS). In addition to traditional process mining functionality, the EMS offers a cloud-based solution for real-time data extraction and analysis, as well as task mining functionality.

3. UiPath Process Mining:

UiPath is a global company founded in Bucharest, Romania specializing in robotic process automation (RPA). UiPath acquired Process Gold Process Mining in 2019 and has a strong background in both task and process mining, especially as an enabler for intelligent automation. UiPath is known for its task mining tool that uses artificial intelligence to identify and aggregate employee workflows to identify repetitive tasks. Together with UiPath Task Mining, the UiPath Process Mining solution is offered within the UiPath Business Automation Platform. UiPath also offers a free Community Edition license for its software studio allowing for students and developers to try out the platform.

4. SAP Signavio Process Mining:

For organizations with an SAP ERP landscape, Signavio is a process mining solution to consider. In the past, you may have been more familiar with SAP's Intelligent Business Process Management Solution or the integration of Celonis Process Mining within the SAP solution. SAP acquired Signavio in 2021 and has worked on integrating Signavio as a prime process intelligent offering. Signavio offers a broad range of business process management solutions and a unique Collaboration Hub to drive operational excellence. SAP Signavio's Process Transformation suite can be used for a variety of purposes, including process insights, process automation, process management and process modeling. Unlike many other solutions, SAP Signavio does not offer task mining capability but does have a partner network to suit this need.

5. IBM Process Mining:

The IBM Process Mining product suite uses data-driven process insights to help companies across markets improve processes and make faster, more informed decisions. IBM's process mining tools can be applied in use cases like intelligent automation, customer onboarding, procure-to-pay (P2P), accounts payable, IT incident management, and order-to-cash. Features include automated robotic process automation (RPA) generation fact-based process models, AI-powered process simulations, conformance checking, task mining, and seamless integrations with leading software SAP, Oracle, and other IBM products.

6. ARIS Process Mining / Software AG:

Aris Process Mining is a solution developed by Software AG, an enterprise software vendor founded in Darmstadt, Germany in 1969. Software AG has over 10,000 enterprise customers in over 70 countries. Aris Process Mining was one of the first commercial process mining tools originating in 2000. Its core advantage is deep integration with enterprise

architecture design. In addition to process mining functionality the ARIS product suite includes process modeling, customer journey modeling, task discovery and RPA functionality. Outside of the ARIS suite Software AG offers complimentary process simulation.

7. ABBYY Timeline:

ABBYY is a market leader in intelligent document processing founded in 1989. In 2019 ABBYY acquired Timeline PI to expand into process mining solutions. Today, ABBYY Timeline is a process intelligence platform including process mining, task mining and process discovery functionality.

8. Microsoft Minit:

Microsoft is an enterprise software provider that needs no introduction. What's less well known is that Microsoft has an increasing solution offering in enterprise automation through its Power Platform. In 2022 Microsoft acquired Minit, a best-of-breed process mining solution based in Bratislava, Slovakia. As of 2023, Microsoft has signaled plans to integrate Minit into its service offering. Today, Microsoft Minit Process Mining is built upon the Azure platform with increased links to Microsoft's Power platform, including Power BI.

9. StereoLogic:

StereoLOGIC offers an integrated process mining and task mining platform focused on digital transformation. It is originally based on task capture technology extracting and mapping employee tasks from the employee user interface. StereoLOGIC is based in Toronto, Canada and was founded by entrepreneurs with an intelligent automation background previously from Blueprint Systems.

CHAPTER 6

REAL TIME EXAMPLES

Certainly! Process mining involves extracting insights and information from event logs to understand and analyze real-life processes. Here's a real-time example of

process mining:

Example: Order Fulfillment Process in an E-commerce Company.

Imagine you're working for a large e-commerce company that sells a variety of products online. The order fulfillment process involves several steps, from receiving an order to delivering the product to the customer. You want to optimize this process using process mining techniques.

1.Data Collection:

You gather event logs from various systems, including the online store platform, inventory management software, and shipping providers. These event logs contain timestamps and details about each step of the order fulfillment process, such as order creation, payment processing, inventory check, packing, and shipping.

2.Event Log Analysis:

Using process mining tools, you load the event logs into the software. The software generates visual representations of the actual order fulfillment process based on the event data. You see the sequence of activities, the time taken for each step, and potential bottlenecks.

3.Process Visualization:

The process mining tool creates a process map or flowchart that illustrate the order fulfillment process. This map shows the paths followed by orders, the time spent at each stage, and where deviations or delays occur.

4.Performance Analysis:

You notice that there are certain orders that experience longer processing times compared to others. By drilling down into the data, you identify that a specific product category consistently takes more time during packing due to a lack of standardized packing procedures.

5.Identifying Bottlenecks:

Process mining helps you identify bottlenecks where orders are getting stuck. for instance, you find that the inventory check process sometimes results in delays due to synchronization issues between the inventory management software and the order processing system.

6.Process Optimization:

Armed with insights from process mining, you work with the relevant teams to address the identified issues. For example, you update the packing procedure for the problematic product category and implement real-time synchronization between the inventory and order systems to prevent delays.

7.Continuous Monitoring:

After implementing the changes, you continue to monitor the order fulfillment process. You use process mining tools to compare the performance before and after the optimizations. This ongoing monitoring helps you ensure that the improvements are effective and sustainable.

By using process mining in this example, the e-commerce company was able to streamline their order fulfillment process, reduce processing times, and enhance customer satisfaction by ensuring timely deliveries. This is just instance how process mining can be applied to real-time scenarios to improve operational efficiency.

CHAPTER 7

LEARNING OUTCOMES

- Gain an overall understanding of basic Process Mining concepts.
- Become familiar with Mining core services and tools.
- Learn the architectural principles of the process Mining.
- Understand and be able to explain Process mining and compliance measures.

- Understand the Process Mining budget and pricing philosophy.
- Engage in hands-on practice to hone key skills. Learn the knowledge and skills required to take the Process Mining Virtual Internship Certified.

CONCLUSION

By doing this internship we learnt

- The importance of Process Mining.
- Tools that helps us to optimize our service costs.
- Software Production and Estimation.
- Processing the Huge data.
- And other different Services that are provided in Mining.

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