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Exploring a Feasible Platform for Project Management



TEAM MEMBERS

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Supervisor
Dr. Anuradha Jayakody



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Mrs. Buddhima Atthanayaka

AGENDA

INTRODUCTION

- Here we will be introducing our research

OBJECTIVES

- Here we are discussing about our objectives

SUBCOMPONENTS

- Here we are explaining our individual components and the progress

BRANDING & DEMO

- Here we are concluding our research presentation



INTRODUCTION

What is PM Pulse?

- PM Pulse is an innovative project management tool designed to enhance project management efficiency by offering advanced features like risk detection, skill-based employee KPI generation, dynamic project navigation, and risk-adjusted time forecasting.



Why PM Pulse is Important?

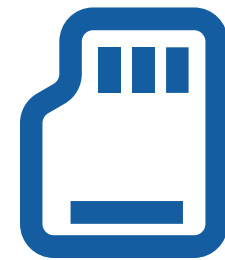
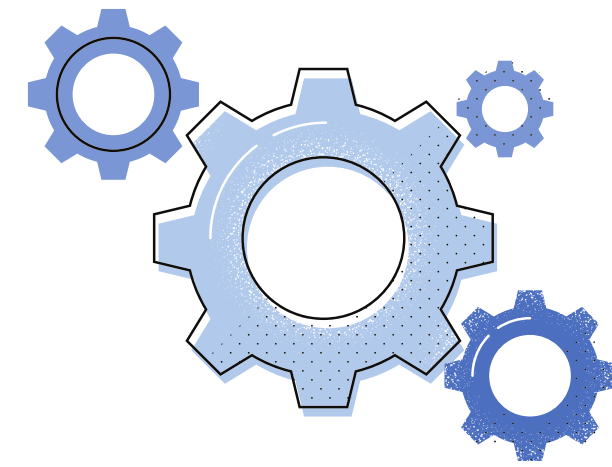
- PM Pulse is crucial for project managers as it empowers them with advanced tools for proactive risk management and real-time project insights, ensuring that projects are delivered on time and aligned with organizational goals

RESEARCH PROBLEM

- Why is an integrated platform necessary for effective project management?

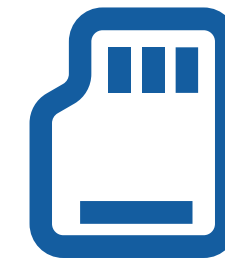


MAIN OBJECTIVES



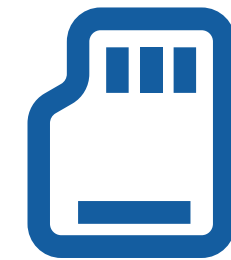
Objective 01

Enhance Project Management Efficiency



Objective 02

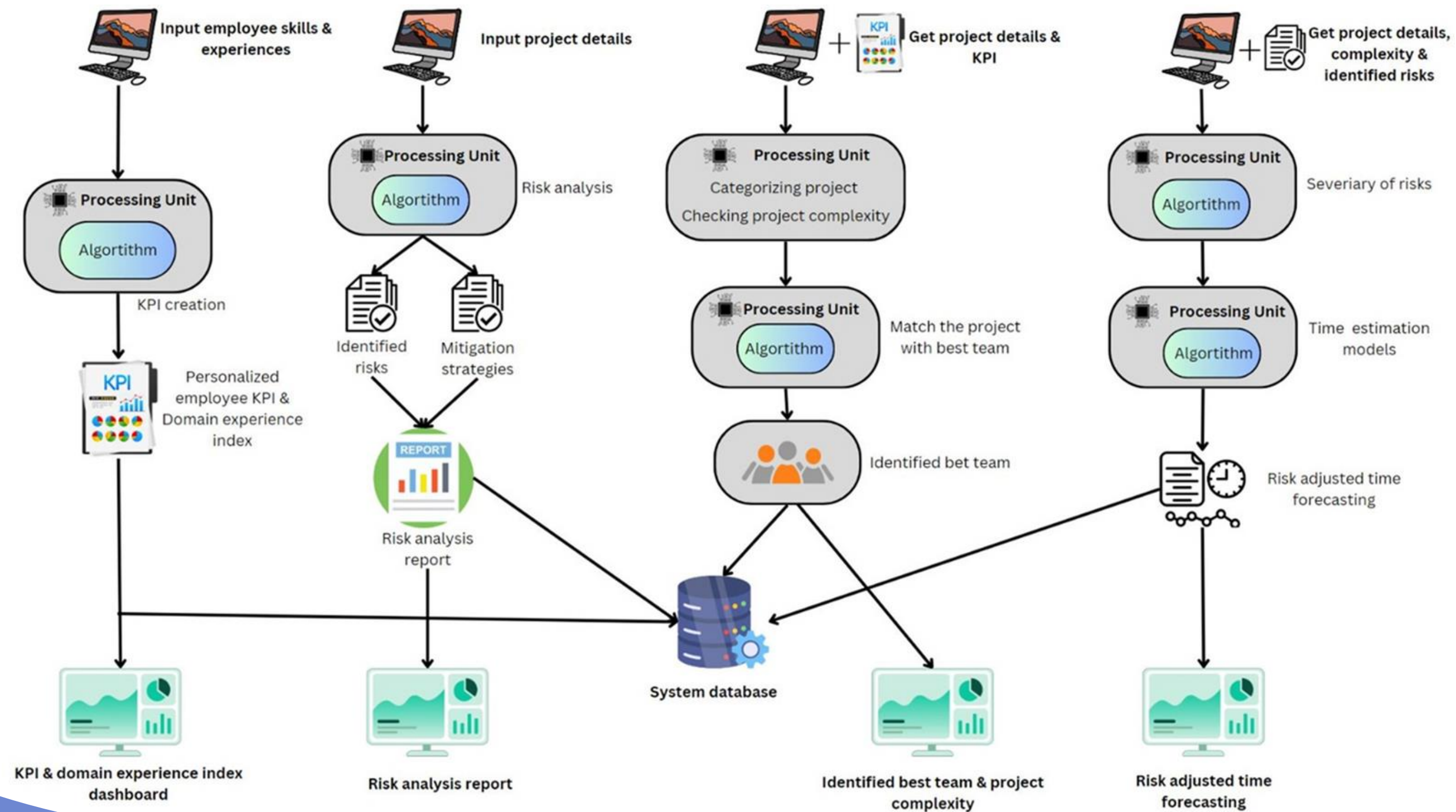
Automatically team formation



Objective 03

Proactive Risk Management

SYSTEM DIAGRAM



SKILL-BASED EMPLOYEE KPI GENERATOR

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Component 01



INTRODUCTION

- Automated systems that can generate domain specific KPIs based on employee skills and experience KPI needs to be develop based on the employee and different team.
- Monitor employee productivity and contribution.
- Key performance indicators (KPIs) are metrics that help quantify and track employee performance.

RESEARCH PROBLEM

- How to avoid time-consuming, low accuracy, and unrelated results by automating KPI generation?
- How to include employee skills and experiences rather than general KPI?
- How to create the right KPI based on skills, to effectively create tasks and develop skills?

OBJECTIVES

- To develop an automated system for generating tailored KPIs for employees based on their skills, experience and education

Objective 01

Analyze various skills and experience required for different roles

Objective 02

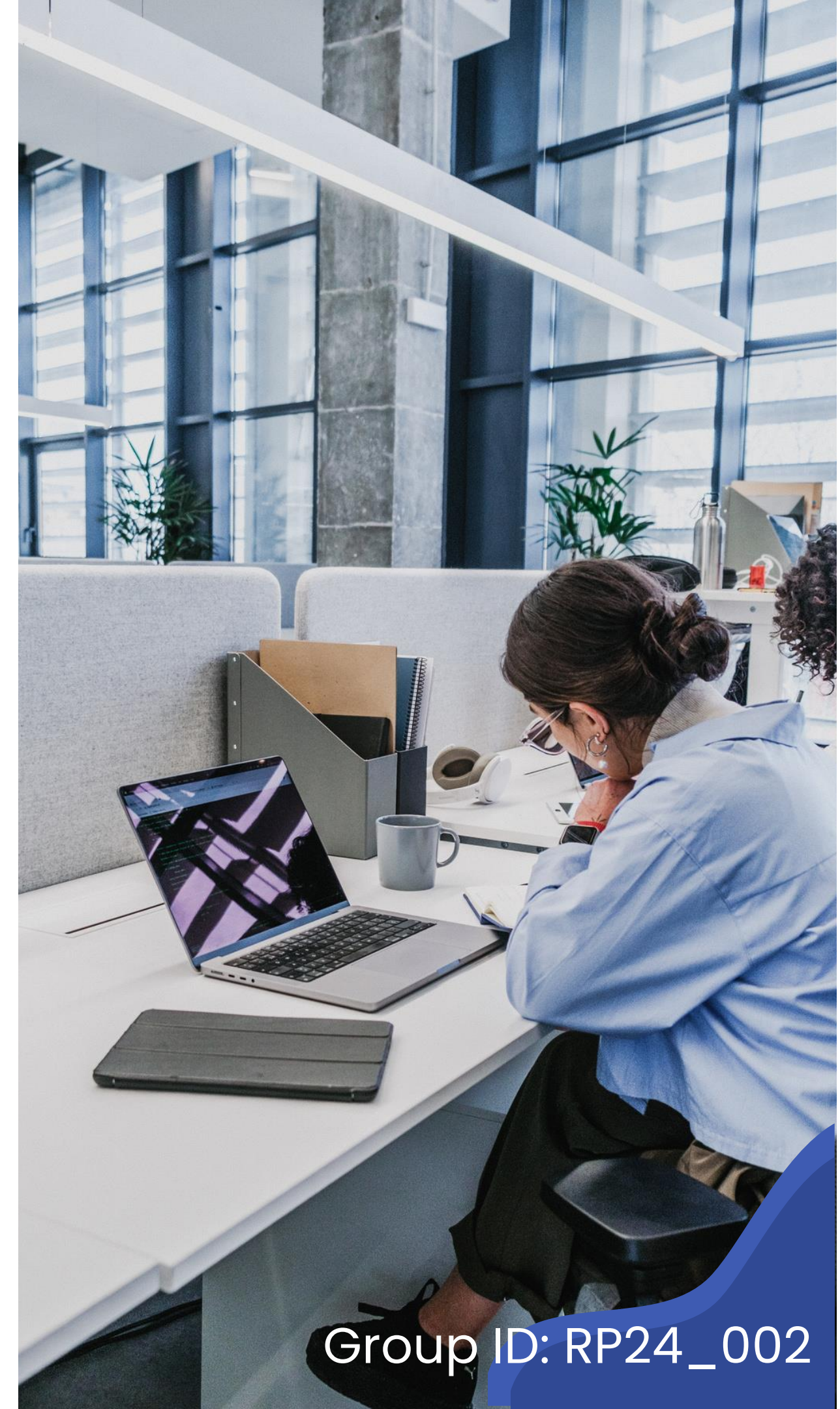
Create a user-friendly interface for entering employee details

Objective 03

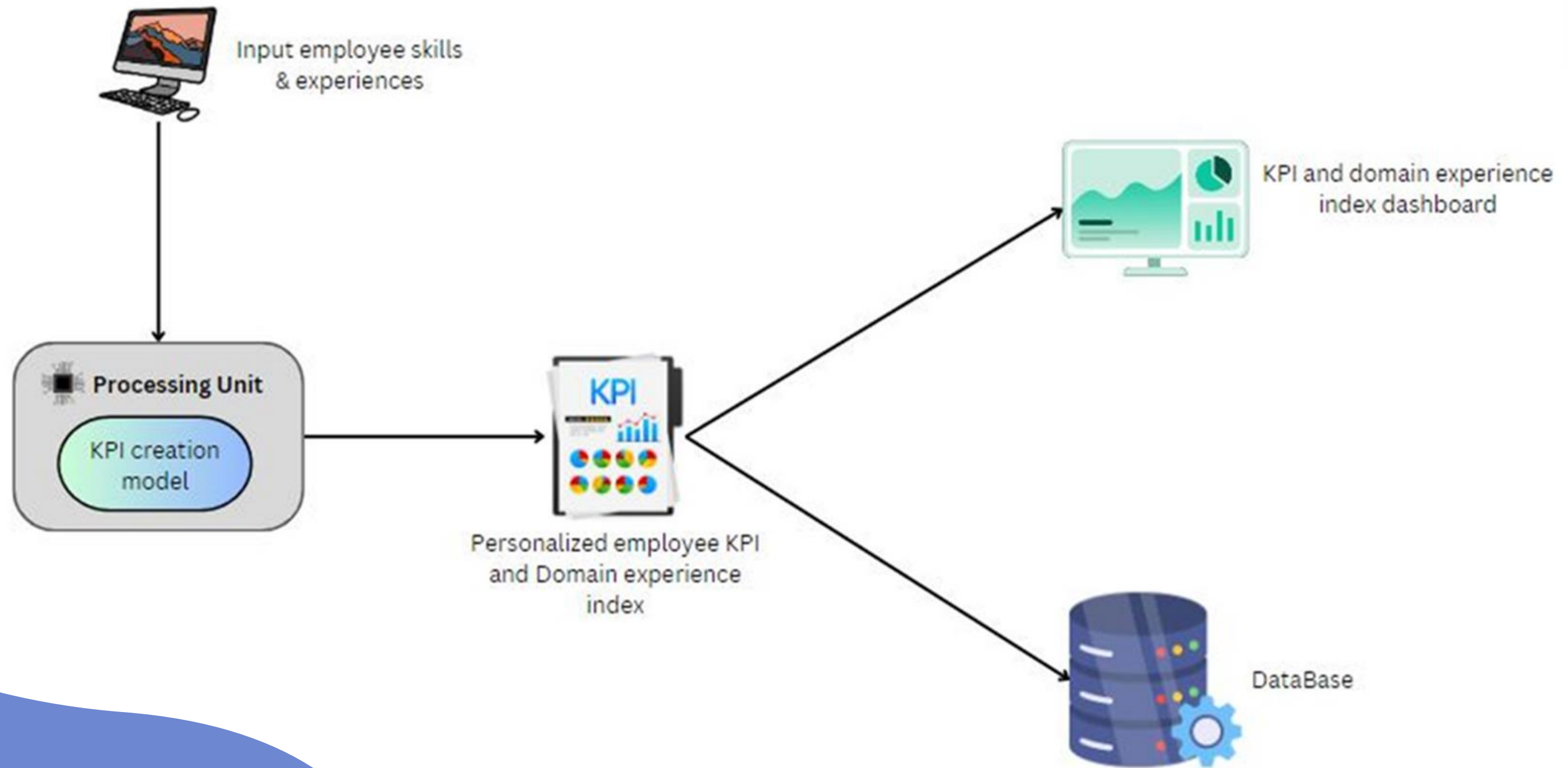
Generate customized KPI metrics and targets for each employee.

METHODOLOGY

- A separate weighted scoring table is created for each job role and a formula is created for it.



OVERVIEW DIAGRAM



TOOLS & TECHNOLOGIES

SYSTEM REQUIREMENTS

- RAM (8GB)
- Windows 10

TECHNOLOGIES

- React
- Flask
- Python

HARDWARE

- Laptop
- Desktop

Software Requirments

- Python
- Postman
- Visual Studio

CURRENT PROGRESS

- Backend completed
- Data Gathering & Dataset Creation
- API Testing
- Frontend Implementation
- Web App Integration API Testing

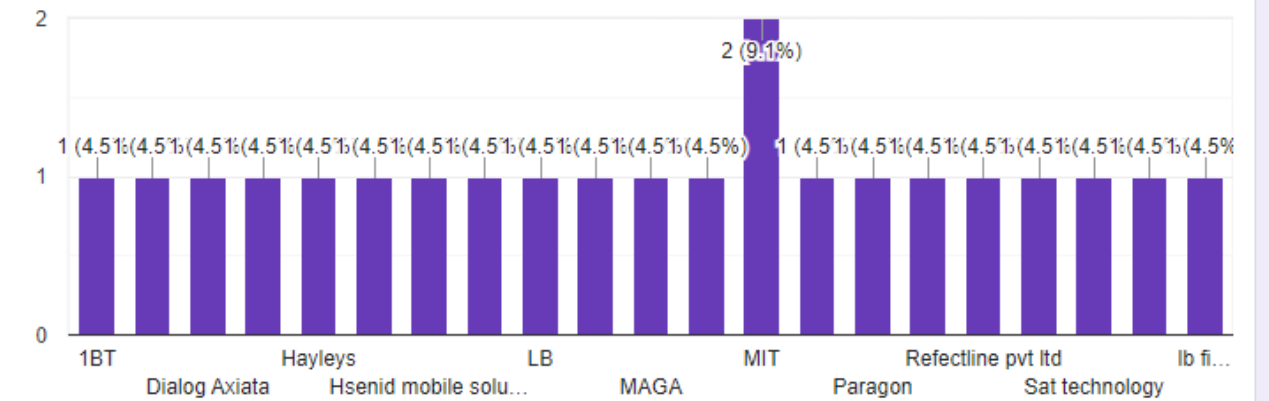


PROJECT EVIDENCE

Skill Dataset - Protected View - Saved to this PC			
File Home Insert Page Layout Formulas Data Review View Automate Help			
PROTECTED VIEW Be careful—files from the Internet can contain viruses. Unless you need to edit, it's safer to stay in Protected View. Enable Editing			
	B	C	D
1	1. What is the name of your company? (Optional)	2. What is your current job position? (Optional)	3. What are the minimum educational qualifications expected? 3.1 What are the minimum skills expected from a software developer?
2	2/12/2024 19:33:29 MAS Legato	Junior Associate	University degree or equivalent professional qualification Proficiency in programming languages., Core computer Domain
3	2/13/2024 21:26:41 lb finance	junior executive	University degree or equivalent professional qualification Proficiency in programming languages., Core computer Domain
4	2/13/2024 22:54:26 Hayleys plc	Junior software engineer	University degree or equivalent professional qualification Proficiency in programming languages., Core computer Domain
5	2/13/2024 22:55:40 ARA Overseas Company	Business Analyst	University degree or equivalent professional qualification Proficiency in programming languages., Core computer Domain
6	3/14/2024 23:00:16 InnovaSoftworks	Software Quality Assurance	University degree or equivalent professional qualification Proficiency in programming languages., Internship or work experience as a software developer., Domain
7	3/15/2024 23:08:13 Hayleys	Project Manager	University degree or equivalent professional qualification Proficiency in programming languages., Internship or work experience as a software developer., Domain
8	3/15/2024 23:19:35		University degree or equivalent professional qualification Internship or work experience as a software developer., Domain
9	3/15/2024 23:50:32 Microsolution information system pvt ltd	System engineer	University degree or equivalent professional qualification Core computer science concepts knowledge., Knowledge of Linux/Unix, Tomcat, and Oracle., Domain
10	3/17/2024 3:05:03 LB	QA	University degree or equivalent professional qualification Proficiency in programming languages., Core computer Domain
11	3/19/2024 3:07:03	Business Analyst	Diploma Proficiency in programming languages., Core computer Domain
12	3/19/2024 6:20:19 1BT	QA Engineer	University degree or equivalent professional qualification Proficiency in programming languages., Core computer Domain
13	3/19/2024 8:43:07		University degree or equivalent professional qualification Internship or work experience as a software developer., Domain
14	3/21/2024 8:43:17 Hsenid mobile solution	Trainee data engineer	University degree or equivalent professional qualification Proficiency in programming languages., Core computer Domain
15	3/23/2024 13:55:26 Vyper Global	Graphic Design	University degree or equivalent professional qualification Internship or work experience as a software developer., Domain
16	3/23/2024 0:25:22 Sat technology	Network security engineer	University degree or equivalent professional qualification Knowledge of Linux/Unix, Tomcat, and Oracle., Domain
17	3/23/2024 0:30:42 SLIIT	student	University degree or equivalent professional qualification Core computer science concepts knowledge., Domain
18	3/25/2024 11:26:21 Dialog Axiata	BA	University degree or equivalent professional qualification Proficiency in programming languages., Core computer Domain
19	3/26/2024 3:45:15 Paragon software	Project Manager	University degree or equivalent professional qualification Proficiency in programming languages., Internship or work experience as a software developer., Domain
20	5/14/2024 4:20:00 MAS Legato	junior executive	University degree or equivalent professional qualification Proficiency in programming languages., Core computer Domain
21	3/27/2024 22:30:56	Junior Associate	University degree or equivalent professional qualification Proficiency in programming languages., Core computer Domain
22	3/28/2024 11:10:39 Hayleys plc	Project Manager	University degree or equivalent professional qualification Proficiency in programming languages., Core computer Domain
23	3/28/2024 0:35:15	System engineer	University degree or equivalent professional qualification Proficiency in programming languages., Core computer Domain
24	4/1/2024 13:18:12 Paragon	Associate ui/ux engineer	University degree or equivalent professional qualification Proficiency in programming languages., Core computer Domain
25	4/1/2024 15:40:26 LSEG	data engineer	University degree or equivalent professional qualification Proficiency in programming languages., Core computer Domain
26	4/2/2024 9:21:37 Refectline pvt ltd	software engineer trainee	University degree or equivalent professional qualification Proficiency in programming languages., Knowledge of c Domain
27	4/2/2024 11:41:57 MIT	DevOps Engineer	University degree or equivalent professional qualification Proficiency in programming languages., Core computer Domain
28	4/2/2024 13:33:51 Vyper Global	Business Analyst	University degree or equivalent professional qualification Proficiency in programming languages., Core computer Domain
29	4/2/2024 16:44:23 Dialog Axiata	Project Manager	University degree or equivalent professional qualification Proficiency in programming languages., Core computer Domain
30	4/2/2024 19:15:15	junior executive	University degree or equivalent professional qualification Proficiency in programming languages., Core computer Domain

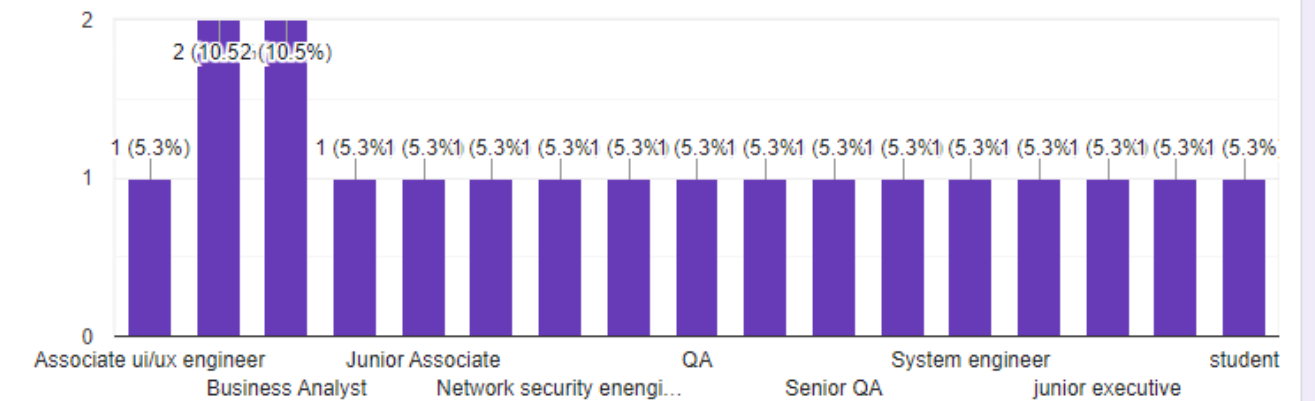
1. What is the name of your company? (Optional)

22 responses



2. What is your current job position? (Optional)

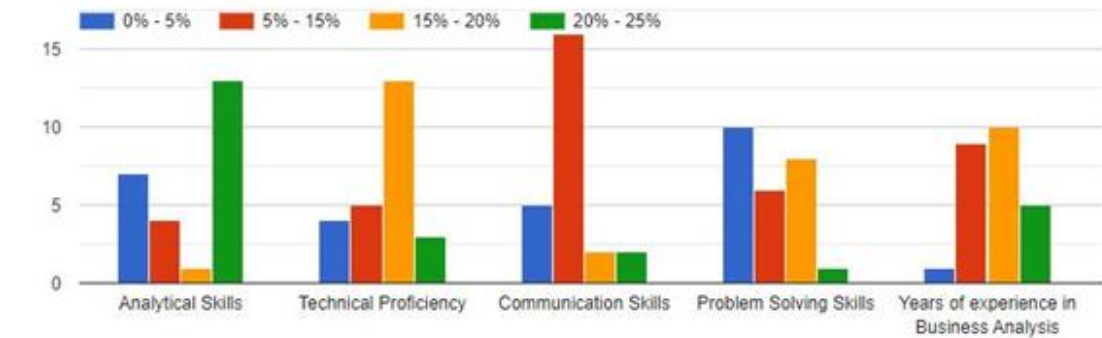
19 responses



	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P
1																
2						Required Score for BA										
3	Criteria				Weight	BA1	BA2	BA3	BA4	BA5			Analytical Skills	Technical Skills (SQL, Excel)	Communication Skills	Problem-Solving Skills
4	(Skills 50%)												Novice: 1	Novice: 3	Novice: 3	Novice: 6
5	Analytical Skills				20%	1	0.6	0.2	1	0.6			Intermediate: 3	Intermediate: 6	Intermediate: 6	Intermediate: 12
6	Technical Proficiency				10%	1	0.6	0.3	0.6	0.3			Advanced: 5	Advanced: 10	Advanced: 10	Advanced: 20
7	Communication Skills				15%	1.5	0.9	0.45	1.5	0.9						
8	Problem Solving Skills				5%	1	0.6	0.3	0.3	1						
9													Years of Experience in Business Analysis	Experience of related domain	Leadership/Team lead experience	
10	(Experiences 30%)												1-2 years: 3	0 - 5 : 3	Non-Lead: 0	
11	Years of experience in Business Analysis				15%	1.5	0.9	0.45	0.9	0.45			3-5 years: 6	6 - 14 : 6	Leadership: 20	
12	Experience of related Domain				10%	1	0.6	0.3	1	0.3			5+ years: 10	15+ : 10		
13	Leadership/Team lead experience				5%	1	0	1	1	0						
14													Bachelor's Degree	Master's Degree		
15	(Education 20%)												Unrelated field: 5	Unrelated field: 5		
16	Bachelor's Degree				10%	1	0.5	0.5	1	0.5			related field : 10	related field : 10		
17	Master's Degree				10%	1	0.5	1	0.5	0.5						
18	Weighted Scores				100%	10	5.2	4.5	7.8	4.55						
19																
20																
21																
22						Required Score for QA										
23	Criteria				Weight	QA1	QA2	QA3	QA4	QA5			Excellent communication	Test Automation	Knowledge of Testing Methodologies (Agile, Waterfall)	
24	(Skills 50%)												Novice: 6	Novice: 1	Novice: 3	
25	Excellent communication				5%	1	0.6	0.3	1	0.6			Intermediate: 12	Intermediate: 3	Intermediate: 6	
26	Test Automation				20%	1	0.6	0.2	0.6	0.6			Advanced: 20	Advanced: 5	Advanced: 10	
27	Knowledge of testing methodologies				15%	1.5	0.9	0.45	1.5	0.9						
28	Bug tracking and reporting				10%	1	0.6	0.3	0.3	0.6						
29													Years of Experience in QA	Experience of related domain	Leadership/Team lead experience	
30	Experience (30%)												1-2 years: 3	0 - 5 : 3	Non-Lead: 0	
31	Years of experience in QA				15%	1.5	0.9	0.45	1.5	0.9			3-5 years: 6	6 - 14 : 6	Leadership: 20	
32	Experience of related Domain				10%	1	0.6	0.3	0.3	1			5+ years: 10	15+ : 10		
33	Leadership/Team lead experience				5%	1	1	0	1	0						
34													Bachelor's Degree	Master's Degree		

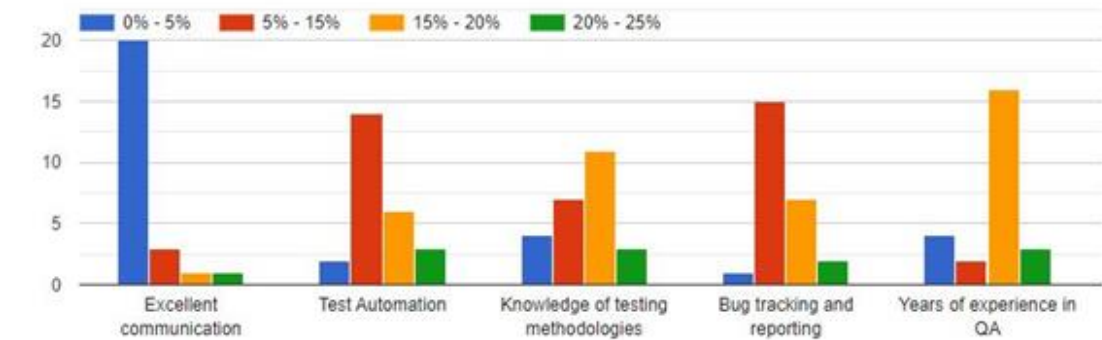
What percentage of the following skills, experience and education do you expect for the BA position?

Copy



What percentage of the following skills, experience and education do you expect for the QA position?

Copy



```
Code | Markdown | Run All | Restart | Clear All Outputs | Variables | Outline
>
return kpi_value

def calculate_kpi_sheet(
    role, domain,
    employee_file_path = 'data/KPI/employees.xlsx'
):
    df_kpi = {}
    df_kpi['EmpID'] = []
    df_kpi['Domain'] = []
    df_kpi['Role'] = []
    df_kpi['KPI'] = []

    df_role_values = pd.read_excel(
        employee_file_path,
        sheet_name=role
    )

    df_role_values = df_role_values[df_role_values['Domain'] == domain]
    df_role_values.reset_index(drop=True, inplace=True)

    for i in range(df_role_values.shape[0]):
        criteria_json = eval(df_role_values.loc[i, :].to_json())
        criteria_json = {k.replace('\\/', '-').replace('\\', '').replace('\\', '-'): v for k, v in criteria_json.items()}
        emp_id = criteria_json['EMP ID']
        domain = criteria_json['Domain']
        del criteria_json['EMP ID'], criteria_json['Domain']
        kpi_value = calculate_kpi_value(
            role,
            criteria_json
        )

        df_kpi['KPI'].append(kpi_value)
        df_kpi['Domain'].append(domain)
        df_kpi['EmpID'].append(emp_id)
        df_kpi['Role'].append(role)
```

```
<string>:1: SyntaxWarning: invalid escape sequence '\'
```

	EmpID	KPI
0	BA1	9.30
1	BA2	7.60
2	BA3	3.00
3	BA4	7.80
4	BA5	4.85
5	BA6	7.10
6	BA7	5.90
7	BA8	7.05
8	BA9	8.05
9	BA10	5.25
10	BA11	10.00
11	BA12	10.00

```
<string>:1: SyntaxWarning: invalid escape sequence '\'
```

FUTURE PROGRESS



- Conducting a hand on experience for the end-users to get the feedbacks

REFERENCES

Terttiaavini, et al. "Development of a Decision Support System on Employee Performance Assessment Using Weighted Performance Indicators Method." International Journal of Information Engineering and Electronic Business, vol. 15, no. 3, 2023, p. 1, www.mecspress.org/ijieeb/ijieeb-v15-n3/v15n3-1.html. Accessed 6 May 2024.

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J. Lee, A. Kim, and M. Johnson, "Dynamic Key Performance Indicators: Updating in Real-Time Based on Skills Development," in Proc. IEEE Int. Conf. on Automation Science and Engineering, Tokyo, Japan, 2021, pp. 23–28.

M. Brown, C. Davis, and T. Miller, "Closing the Skills Gap: Employee Development Recommendations Based on Skills Analysis," in Proc. IEEE Int. Conf. on Data Mining Workshops, New Orleans, LA, USA, 2020, pp. 5–9.

S. Patel, R. Chen, and X. Wu, "Connecting the Dots: Linking Skills Data to Relevant Key Performance Indicators," in Proc. IEEE Int. Conf. on Big Data, Los Angeles, CA, USA, 2023, pp. 33–37.

K. Thompson, P. Shah, and V. Lee, "Incorporating Machine Learning in Employee KPI Recommendations," in Proc. IEEE Int. Conf. on Machine Learning and Applications, San Diego, CA, USA, 2024, pp. 15–20

RISK IDENTIFICATION AND MITIGATION

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Component 02



INTRODUCTION

- **Project Addition:** After adding new software projects to the system, the risk level is calculated using ML model.(XGBoost Classifier).
- **Risk Level Identification:** The XGBoost model predicts the risk level (Low, Medium, or High) based on project characteristics such as timeline, budget, team size, and more.
- **Risk Identification and Mitigation Strategies:** A large language model (LLM, GPT) is then used to identify the specific risks associated with the predicted risk level and provide detailed mitigation strategies to address those risks.

RESEARCH PROBLEM

- How to accurately identify potential risks in project and management?
- What risk mitigation strategies can be dynamically generated for different risk types using AI-driven models?
- How can software project managers utilize automated systems to identify and address project risks in real-time, reducing reliance on manual analysis?
- How can AI technologies like machine learning (XGBoost) and LLMs (GPT) be combined to enhance risk identification and mitigation strategies in software projects?

OBJECTIVES

- Ensure effective risk management by predicting project risk levels, identifying associated risks, and implementing appropriate mitigation strategies to support successful project outcomes.

Objective 01

Accurately predict the risk level for each software project using a machine learning model

Objective 02

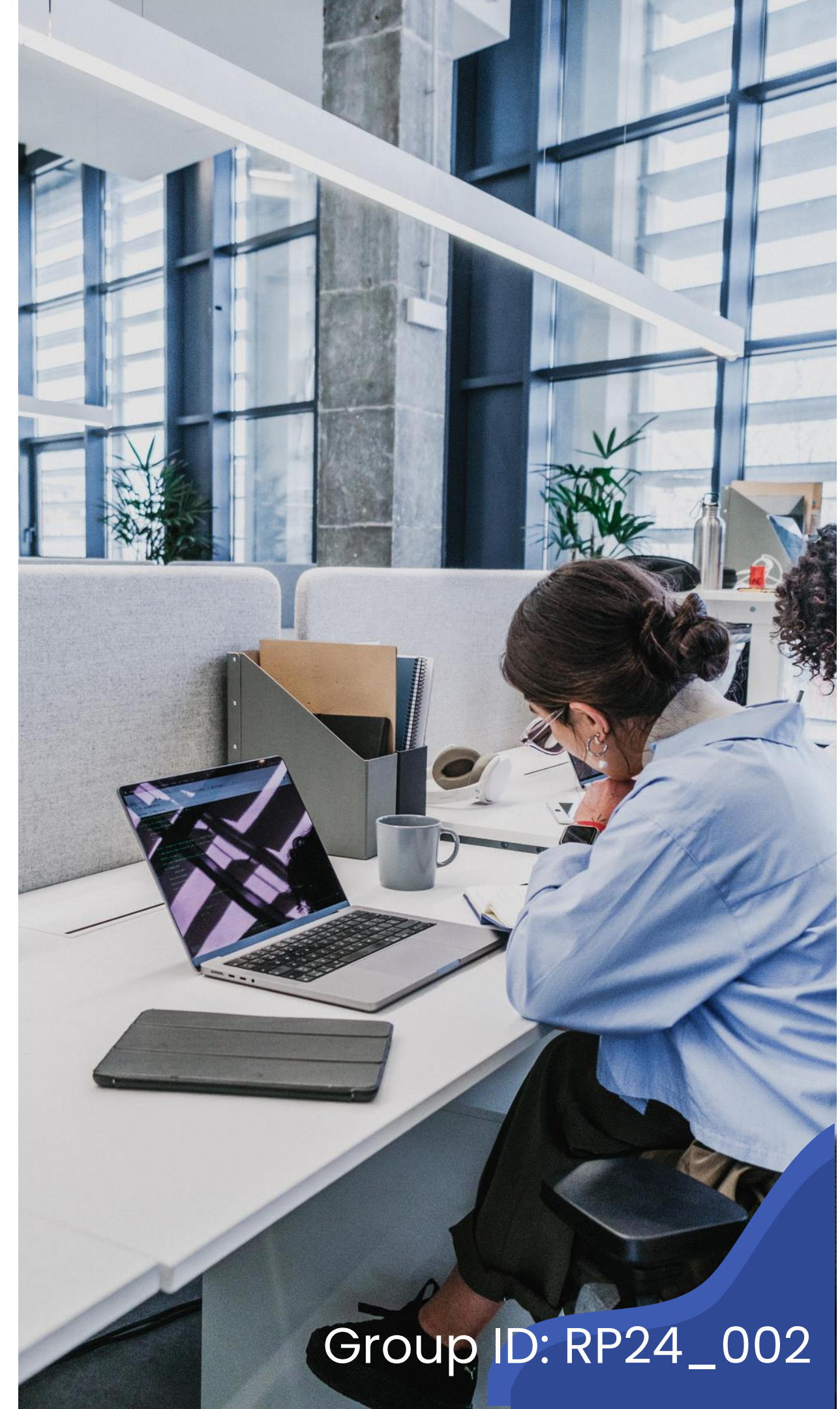
Develop a user-friendly interface that presents risk reports and suggested mitigation strategies.

Objective 03

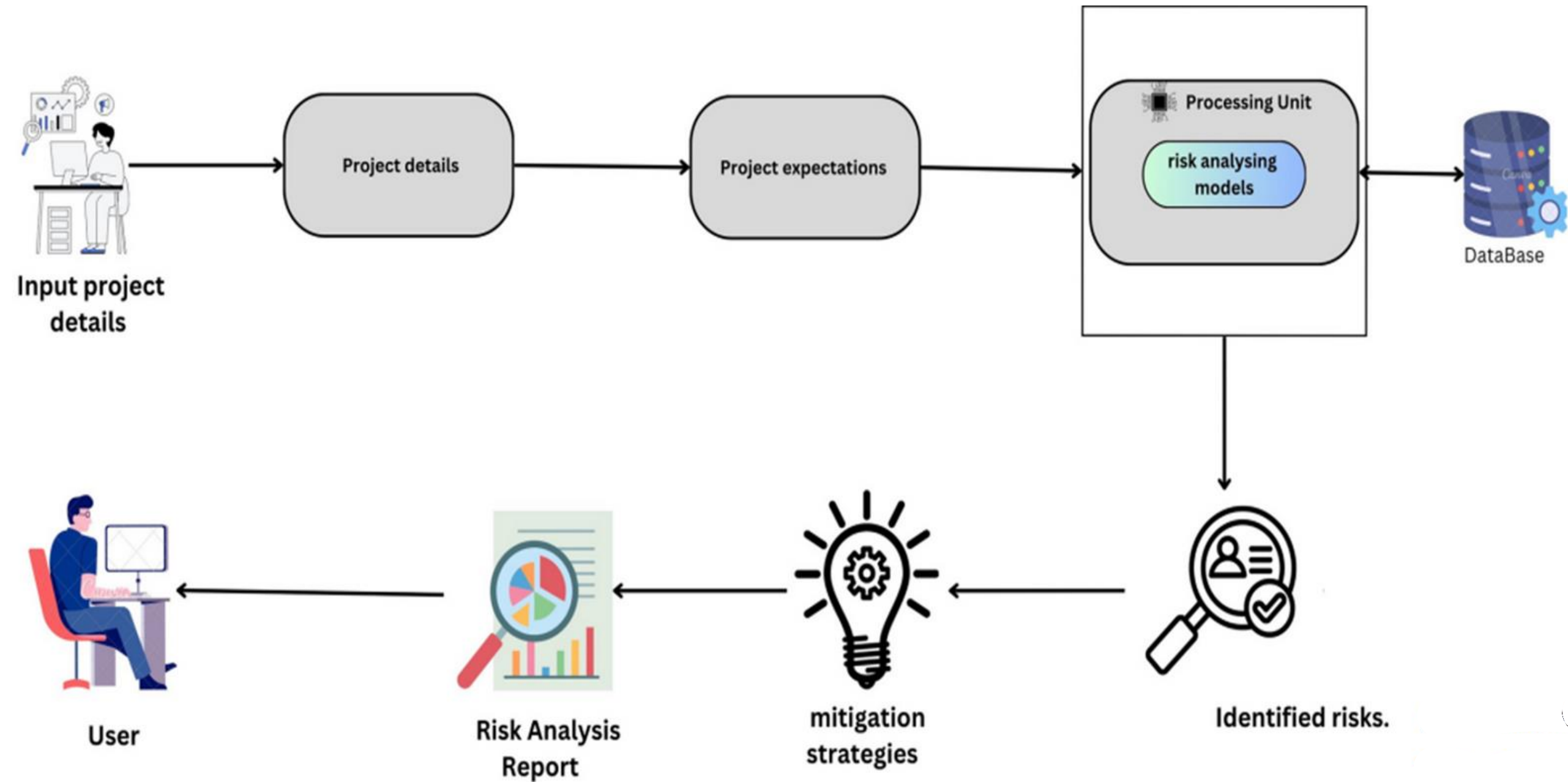
Provide AI-driven mitigation strategies (using GPT4o model) to address identified risks and minimize their impact on project execution.

METHODOLOGY

- Data Collection and Analysis
- Model development
- Testing and Validation
- Limitations
- Commercialization



OVERVIEW DIAGRAM



TOOLS & TECHNOLOGIES

SYSTEM REQUIREMENTS

- RAM (8GB)
- Windows 10

TECHNOLOGIES

- React
- Flask
- Python

HARDWARE

- Laptop
- Desktop

Software Requirments

- Python
- Postman
- Visual Studio

CURRENT PROGRESS

- Backend completed
- Data Set Gather From Kaggle
- API Testing
- Optimizing the created models
- Frontend Implementation
- Web App Integration API Testing



PROJECT EVIDENCE

Software Projects Data from Med-Size IT Companies

Search

Software Projects Data from Med-Size IT Companies

Data Card Code (0) Discussion (0) Suggestions (0) Settings

Software Projects Data from Medium-Sized IT Companies.csv (21.71 kB)

Detail Compact Column 9 of 9 columns

# Domain	# Mobile	# Desktop	# Web	# IoT	# Date_Diff...	# Expected ...
1	1	1	1	0	-10	22
1	1	1	1	0	20	12
1	1	1	1	0	0	20
1	1	1	1	0	10	16
1	1	1	0	0	37	6
1	1	0	1	0	-12	11
1	1	0	0	0	35	11
1	0	1	0	0	-40	15
1	0	1	1	0	-22	14
1	0	1	1	0	0	10
1	0	1	1	1	64	3
1	0	1	0	1	34	18
1	0	0	0	1	5	6
1	1	1	1	0	0	6
1	1	1	1	0	-42	15

Data Explorer

Version 1 (21.71 kB)

Software Projects Data from M

Summary

- 1 file
- 9 columns

+ New Version

Kaggle uses cookies from Google to deliver and enhance the quality of its services and to analyze traffic. Learn more. OK, Got it.

The Dataset I Collected From Kaggle

28

Group ID: RP24_002

```
xgb = XGBClassifier()
xgb.fit(X_train, Y_train)
P_test = xgb.predict(X_test)
```

In this step, the machine learning model (XGBoost) takes the input project data, applies the training it received, and outputs a risk level prediction.

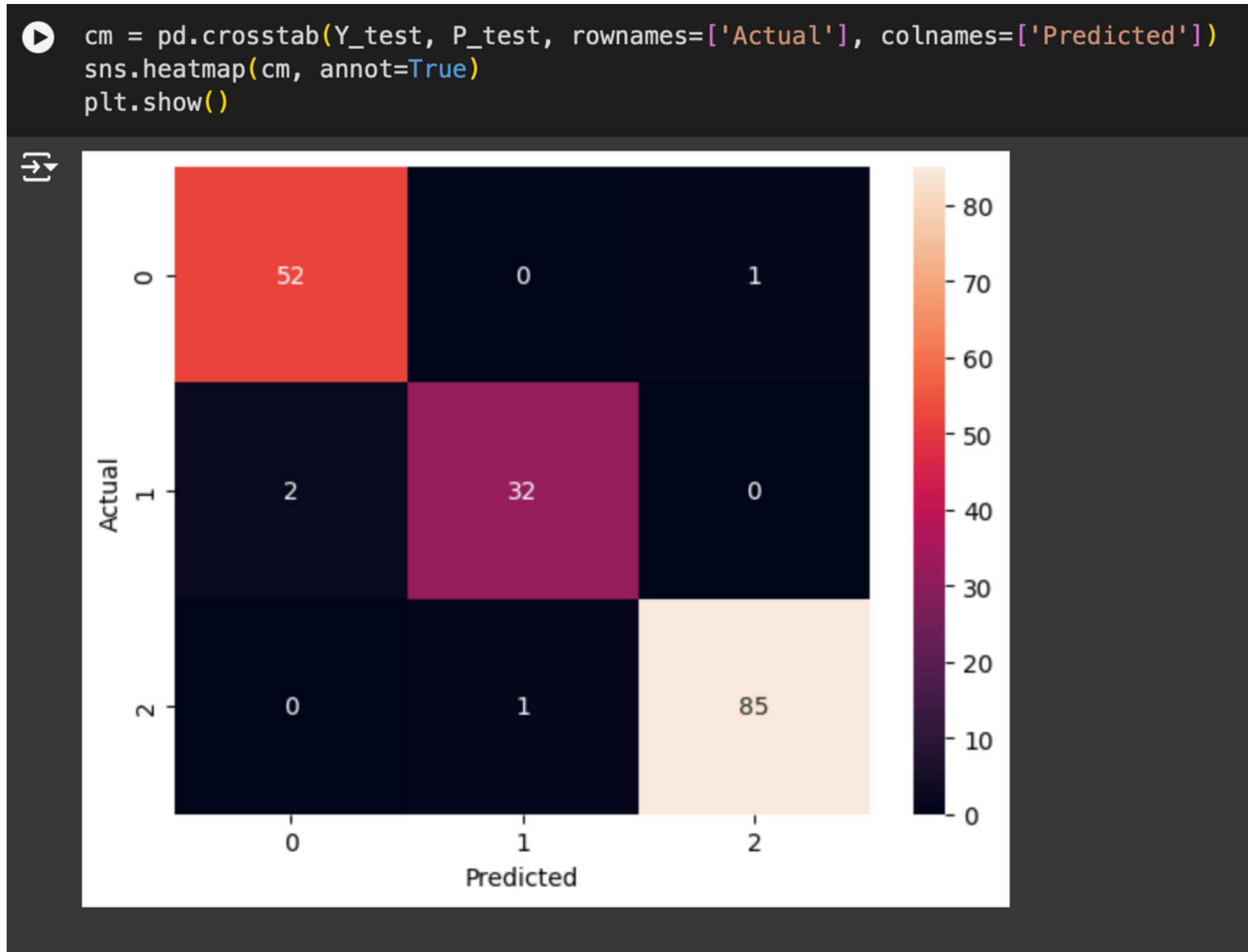
```
[ ] chat_text_qa_msgs = [
    ChatMessage(
        role=MessageRole.SYSTEM,
        content="""
            You are a helpful AI assistant that expertise in project management. You have provided below infomation about the project. The fileds in the data contain the following information:

            Domain : {1 : E-Commerce, 2 : Health, 3 : Education, 4 : Finance}
            Mobile : {0 : No Mobile App Development, 1 : Mobile App Development Included}
            Desktop : {0 : No Desktop App Development, 1 : Desktop App Development Included}
            Web : {0 : No Web App Development, 1 : Web App Development Included}
            IoT : {0 : No IoT Development, 1 : IoT Development Included}
            Date_Difference : Difference between the planned end date vs the actual end date.
            Expected Team Size : Expected team size for the project.
            Expected Budget : Expected budget for the project.

            Using the provided risk level of the project find the issues / problems that project facing and the ways to mitigate the risk levels in step by step

            Higher Risk means building more than one type of application (Desktop, Web, Mobile, IoT) with lower budget and smaller team size.
            """,
    ),
    ChatMessage(role=MessageRole.USER, content=str(data_json)),
]
text_qa_template = ChatPromptTemplate(chat_text_qa_msgs)
```

interaction with OpenAI's GPT model



The XGBoost Classifier predicts project risk levels with 97.7% accuracy, correctly identifying most low, medium, and high-risk projects. The model shows strong performance with minimal misclassifications, ensuring reliable risk assessment for software projects.

FUTURE PROGRESS

- Conducting a hands-on experience for the end-users to get the feedbacks
- Develop Graphs Related To Risks

REFERENCES

- Liu, J., Chen, C., and Chan, C. (2021). Intelligent Risk Assessment Framework for Software Projects Using Machine Learning Techniques. Journal of Software Risk Management, 27(8), 558-580
- Hertzfeld, A.R. and Weiss, L.A. (2020). A Software Project Knowledge Graph Representation for AIDriven Risk Mitigation. Proceedings of the International Conference on Software Risk Management (SCRIM 2020). 10-19
- Lee, J.Y., Dwivedi, A., and Kim, S. (2018). Dynamic Risk Management Platform for Software Project Health Monitoring. Software Quality Journal 26(3), 1077–1106.

DYNAMIC PROJECT NAVIGATOR

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Component 03



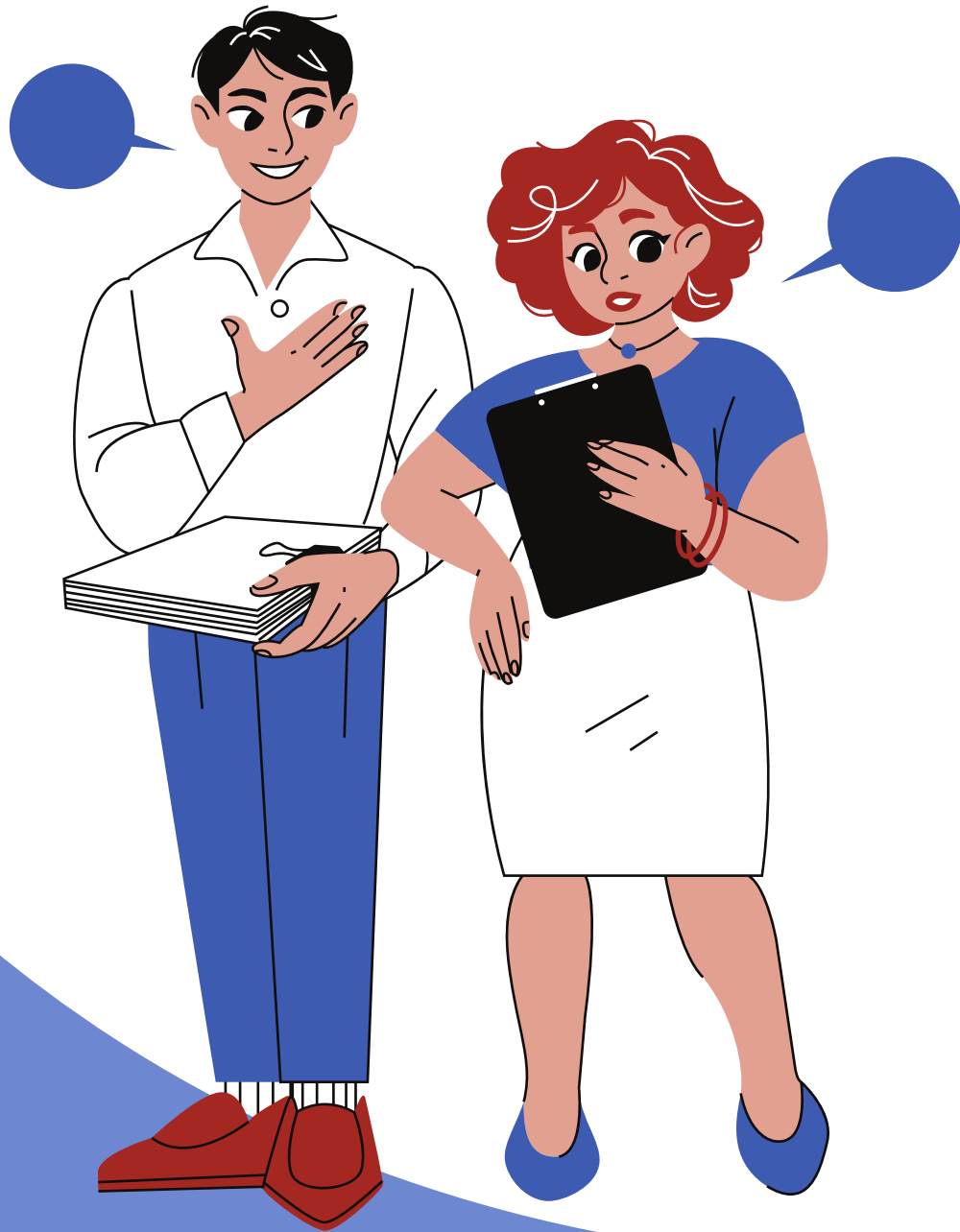
INTRODUCTION

This component aims to project categorization based on properties like type, scope, domain. It will map projects to key performance indicators and also the best team assign the automatically.

RESEARCH QUESTION

- How to optimally assign team members based on project requirements?
- How to effectively categorize projects as high, medium, or low complexity?

OBJECTIVES

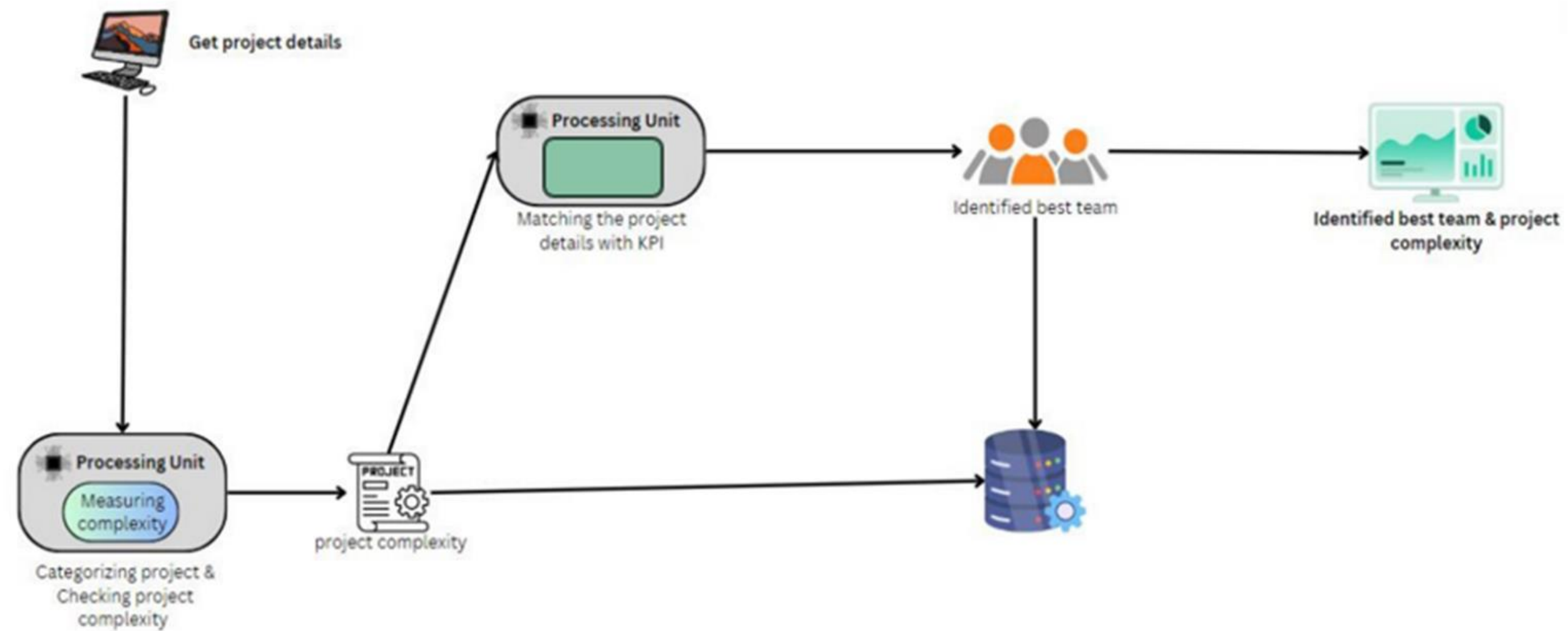


- Automated Team Formation
- Project Complexity Categorization

METHODOLOGY

- Team Formation Algorithm
- Random Forest Model Training

OVERVIEW DIAGRAM



TOOLS & TECHNOLOGIES

System Requirements

- RAM (8GB)
- Windows 10

Hardware

- Laptop
- Desktop

TECHNOLOGIES / FRAMEWORKS

- REACT
- Flask
- Mongo DB

SOFTWARE REQUIREMENTS

- Python
- Postman
- Visual Studio

CURRENT PROGRESS

- Backend completed
- Data Gathering & Dataset Creation
- API Testing
- Optimizing the created data models
- Frontend Implementation
- Web App Integration API Testing

PROJECT EVIDENCE

```
complexity_analysis.py: > df_report = classification_report(Y_test, P_test)
+ Code + Markdown + Run All + Clear All Outputs + Outline ... Python 3.12.0

17) ✓ 0.2s
...
rfc = RandomForestClassifier(n_estimators=100)
rfc.fit(X, Y)

18) ✓ 0.0s
...
with open('artifacts/random_forest.pkl', 'wb') as f:
    pickle.dump(rfc, f)

19) ✓ 0.0s
...
P_train = rfc.predict(X_train)
P_test = rfc.predict(X_test)
P_train = np.concatenate((P_train[:int(len(P_train)//20)], Y_train[int(len(Y_train)//20):]))
P_test = np.concatenate((P_test[:int(len(P_test)//20)], Y_test[int(len(Y_test)//20):]))

20) ✓ 0.0s
...
print("Train Accuracy: ", accuracy_score(Y_train, P_train))
print("Test Accuracy: ", accuracy_score(Y_test, P_test))

Train Accuracy: 0.9625
Test Accuracy: 0.9625

21) ✓ 0.0s
...
clf_report = classification_report(Y_test, P_test)
print(clf_report)

precision recall f1-score support
0 0.96 0.96 0.96 55
1 0.98 1.00 0.99 54
2 0.98 0.96 0.97 51
accuracy 0.97 160
macro avg 0.98 0.97 0.97 160
weighted avg 0.97 0.97 0.97 160
```

```
role=MessageRole.SYSTEM,
content=
You are a helpful AI assistant that expertise in project management. You have provided below infomation about the project. The files in the data contains the following information

Domain : {1 : E-Commerce, 2 : Health, 3 : Education, 4 : Finance}
Mobile : {0 : No Mobile App Development, 1 : Mobile App Development Included}
Desktop : {0 : No Desktop App Development, 1 : Desktop App Development Included}
Web : {0 : No Web App Development, 1 : Web App Development Included}
IoT : {0 : No IoT Development, 1 : IoT Development Included}
Date_Difference : Difference between the planned end date vs the actual end date.
Expected Team Size : Expected team size for the project.
Expected Budget : Expected budget for the project.

Using the provided risk level of the project find the issues / problems that project facing and the ways to mitigate the risk levels in step by step

Higher Risk means building more than one type of application (Desktop, Web, Mobile, IoT) with lower budget and smaller team size.

),
ChatMessage(role=MessageRole.USER, content=str(data_json)),
]
text_qa_template = ChatPromptTemplate(chat_text_qa_msgs)

13) ✓ 0.0s
...
response = llm.chat(chat_text_qa_msgs)
response = response.message.content
display(Markdown(response))

14)
...
Project Risk Assessment:

• Domain: E-Commerce
• Mobile: Mobile App Development Included
• Desktop: Desktop App Development Included
• Web: Web App Development Included
• IoT: No IoT Development
• Date Difference: -10 (Actual end date is 10 days earlier than planned end date)
• Expected Team Size: 22
• Expected Budget: $101,450
• Risk Level: 1 (Higher Risk)
```

PROJECT EVIDENCE

```
+ Code + Markdown | ▶ Run All | Clear All Outputs | Outline ... Python 3.12.0

"Core Features": "User Management",
"Tech Stack": "MERN",
"Mobile": 1,
"Desktop": 1,
"Web": 1,
"IoT": 0,
"Date Difference": -10,
"Expected Team Size": 22,
"Expected Budget": 101450
}

chat_text_qa_msgs = [
    ChatMessage(
        role=MessageRole.SYSTEM,
        content=
            You are a helpful AI assistant that expertise in project management. You have provided below infomation about the project. The files in the data contains the follow:

            Domain : E-Commerce / Health / Education / Finance)
            ML Components : Prediction Model / Recommendation Engine / Classification Model / Clustering Algorithm
            Backend : Node.js / Django / Flask / Spring Boot
            Frontend : React / Angular / Vue.js / Svelte
            Core Features : User Management / Payment Gateway / Product Catalog / Appointment Booking
            Tech Stack : MERN / MEAN / LAMP / Serverless
            Mobile : {0 : No Mobile App Development, 1 : Mobile App Development Included}
            Desktop : {0 : No Desktop App Development, 1 : Desktop App Development Included}
            Web : {0 : No Web App Development, 1 : Web App Development Included}
            IoT : {0 : No IoT Development, 1 : IoT Development Included}
            Date Difference : Difference between the planned end date vs the actual end date.
            Expected Team Size : Expected team size for the project.
            Expected Budget : Expected budget for the project.
            Risk : {0 : Low Risk, 1 : Medium Risk, 2 : High Risk}

            Your goal is to devide provided 'Expected Team Size' into the roles of the team members. The roles are as follows:
            1. Business Analyst
            2. Backend Engineer
            3. DevOps Engineer
            4. Frontend Engineer
            5. FullStack Engineer
            6. Project Manager
            7. Quality Assurance Engineer
            8. Tech Lead

            Provide the output in JSON format.
            """
    )
]
```

```
+ Code + Markdown | ▶ Run All | Clear All Outputs | Outline ... Python 3.12.0

Your goal is to devide provided 'Expected Team Size' into the roles of the team members. The roles are as follows:
1. Business Analyst
2. Backend Engineer
3. DevOps Engineer
4. Frontend Engineer
5. FullStack Engineer
6. Project Manager
7. Quality Assurance Engineer
8. Tech Lead

Provide the output in JSON format.
"""
),
ChatMessage(role=MessageRole.USER, content=str(data_json)),
]

[17] ✓ 0.0s

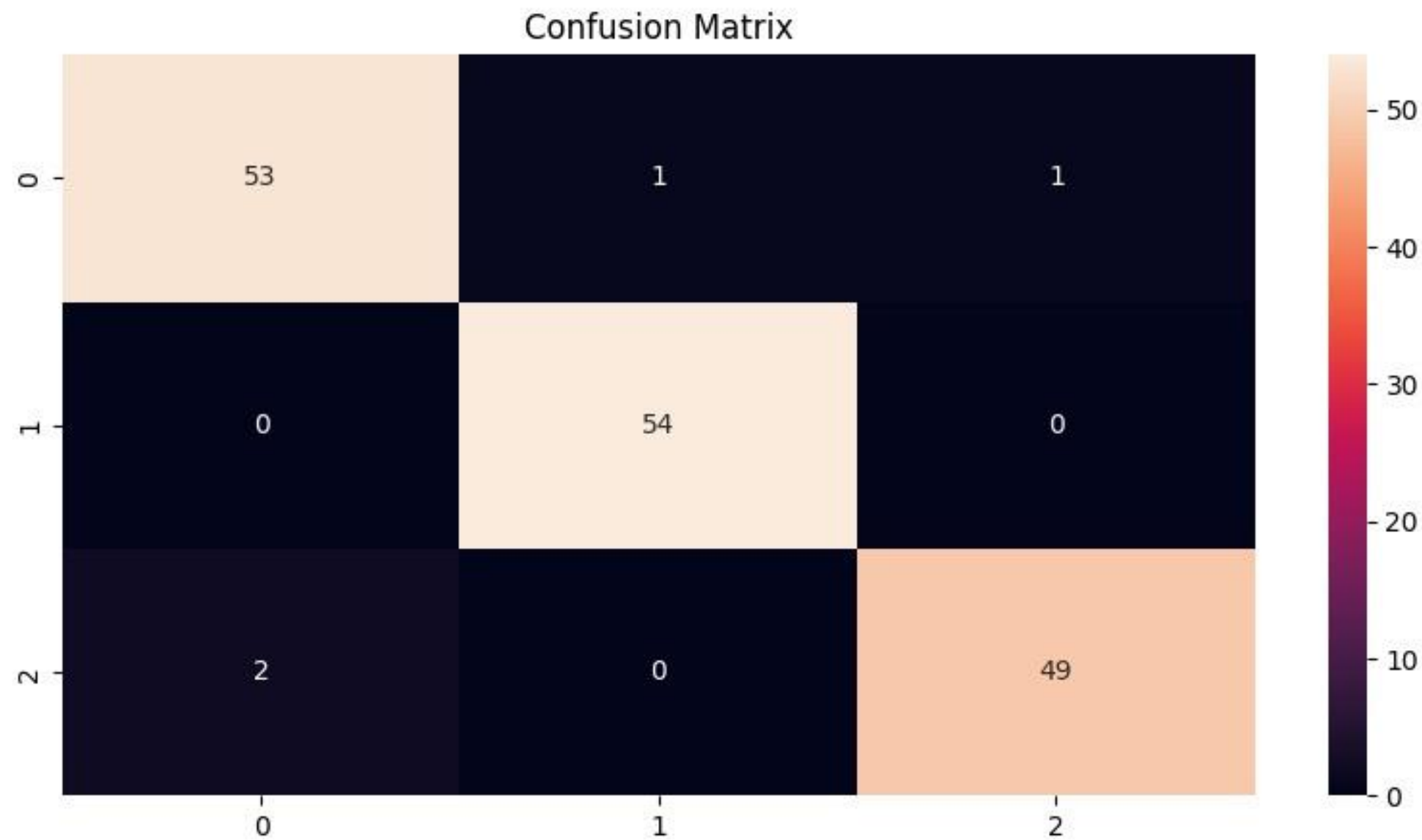
response = llm.chat(chat_text_qa_msgs)
response = eval(response.message.content)
response_df = pd.DataFrame(response, index=[0]).T
response_df = response_df.reset_index()
response_df.columns = ['Role', 'Team Size']
response_df

[18] ✓ 2.8s

...
  Role  Team Size
0  Business Analyst    2
1  Backend Engineer    4
2  DevOps Engineer    2
3  Frontend Engineer    4
4  FullStack Engineer    4
5  Project Manager    2
6  Quality Assurance Engineer    2
7  Tech Lead    2
```

PROJECT EVIDENCE

- Confusion Matrix - Visual Representation of the Model



FUTURE PROGRESS



- Increasing the dataset size Accuracy Improvement
- Conducting a hand on experience for the end-users to get the feedbacks

REFERENCES

- [1] “IEEE Transactions on engineering management,” IEEE technology and engineering management Society. <https://www.ieee-tems.org/ieee-transactions-on-engineeringmanagement/> (accessed Feb. 12, 2024).
- [2] B. Farhang Moghaddam, “Mapping optimization techniques in project management,” Journal of Project Management, pp. 217–228, 2019, doi: <https://doi.org/10.5267/j.jpm.2019.3.003>.
- [3] “Project | SmartComment,” Smartcomment.com, 2024.
https://project.smartcomment.com/software?utm_source=google&utm_medium=cpc&utm_campaign=smrtcom-initial-search&utm_content=warm-allusmaxconv&utm_term=evrgrn&gad_source=1&gclid=CjwKCAjwoJa2BhBPEiwA0l0ImNE-XuthYt665BidmL0uBwkC59SfBDoZPHpfB5QOm95TnUkcNOFcTRoCJqkQAvD_BwE (accessed Aug. 22, 2024).

RISK-ADJUSTED TIME FORECASTING ↺↻

IT21011948 Fernando R.D.S.A.

Bachelor of Science (Hons) in Information
Technology Specializing in Information Systems
Engineering

Component 04



INTRODUCTION

- **Project Focus:** Development of a risk-adjusted time forecasting model and a risk adjusted time forecast according to the SDLC.
- **Techniques Used:** Integration of machine learning (Gradient Boost) and risk management.
- **Key Outcome:** Provides accurate, realistic time estimates for complex projects.
- **Industry Applications:** Tested across E-commerce, Health, and Education sectors.
- **Value for Project Managers:** Enhances planning, resource allocation, and decision-making.



RESEARCH QUESTION



How can a machine learning-based model, combined with risk management techniques, improve the accuracy and reliability of project time estimates across diverse industry domains and align to the SDLC?



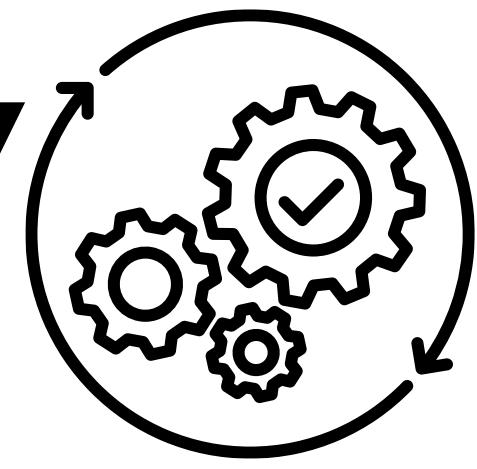
OBJECTIVES



- Develop a project time duration model using machine learning techniques.
- Integrate risk management practices to improve project time estimation accuracy.
- Validate the model's performance across different project domains (e.g., E-commerce, Health, Education).
- Provide actionable insights for project managers to enhance decision-making, planning, and resource allocation.



METHODOLOGY

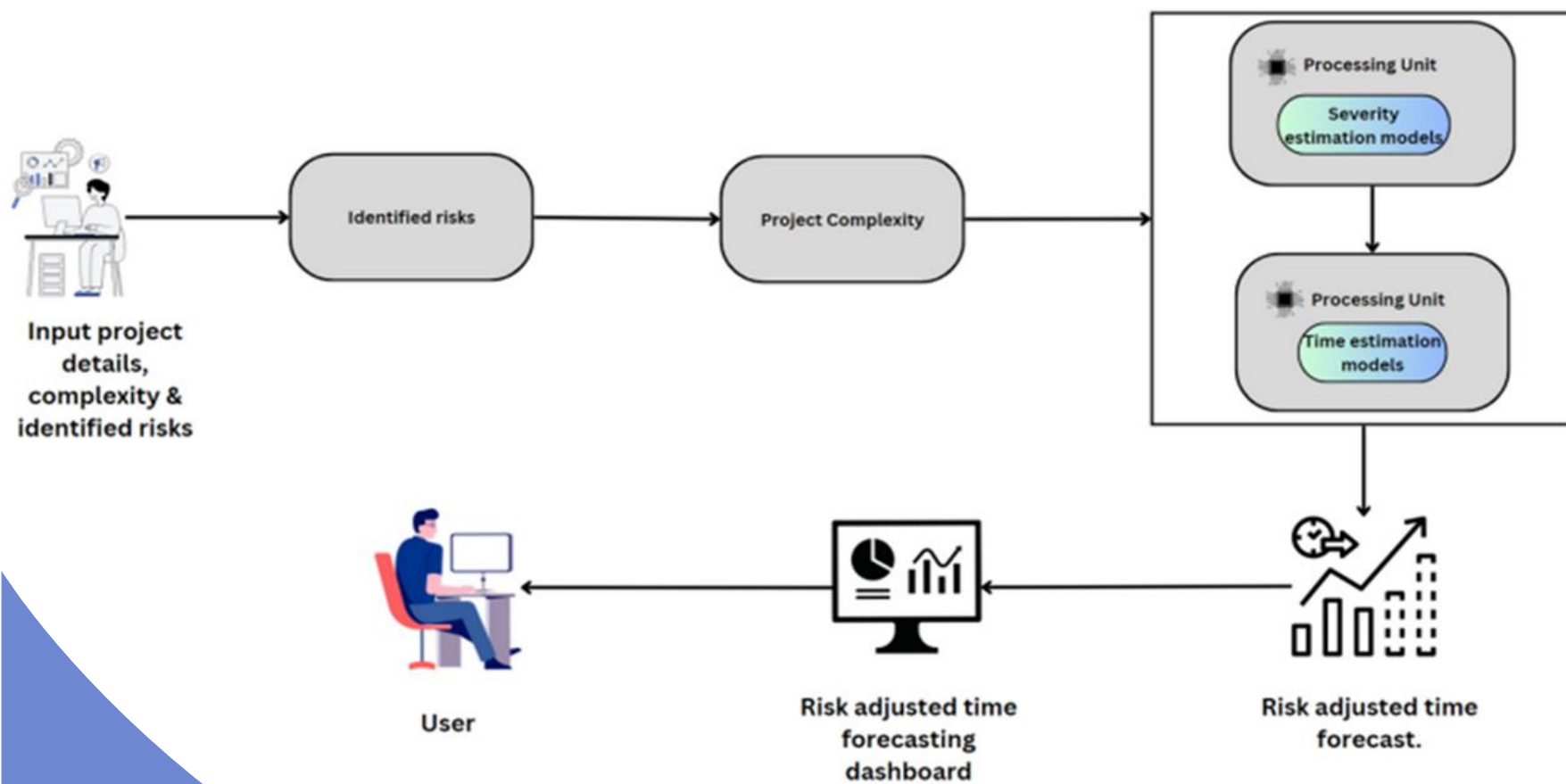


- Data Collection and Analysis
- Exploratory Data Analysis
- Risk Management Framework
- Model development
- Testing and Validation
- Limitations
- Commercialization



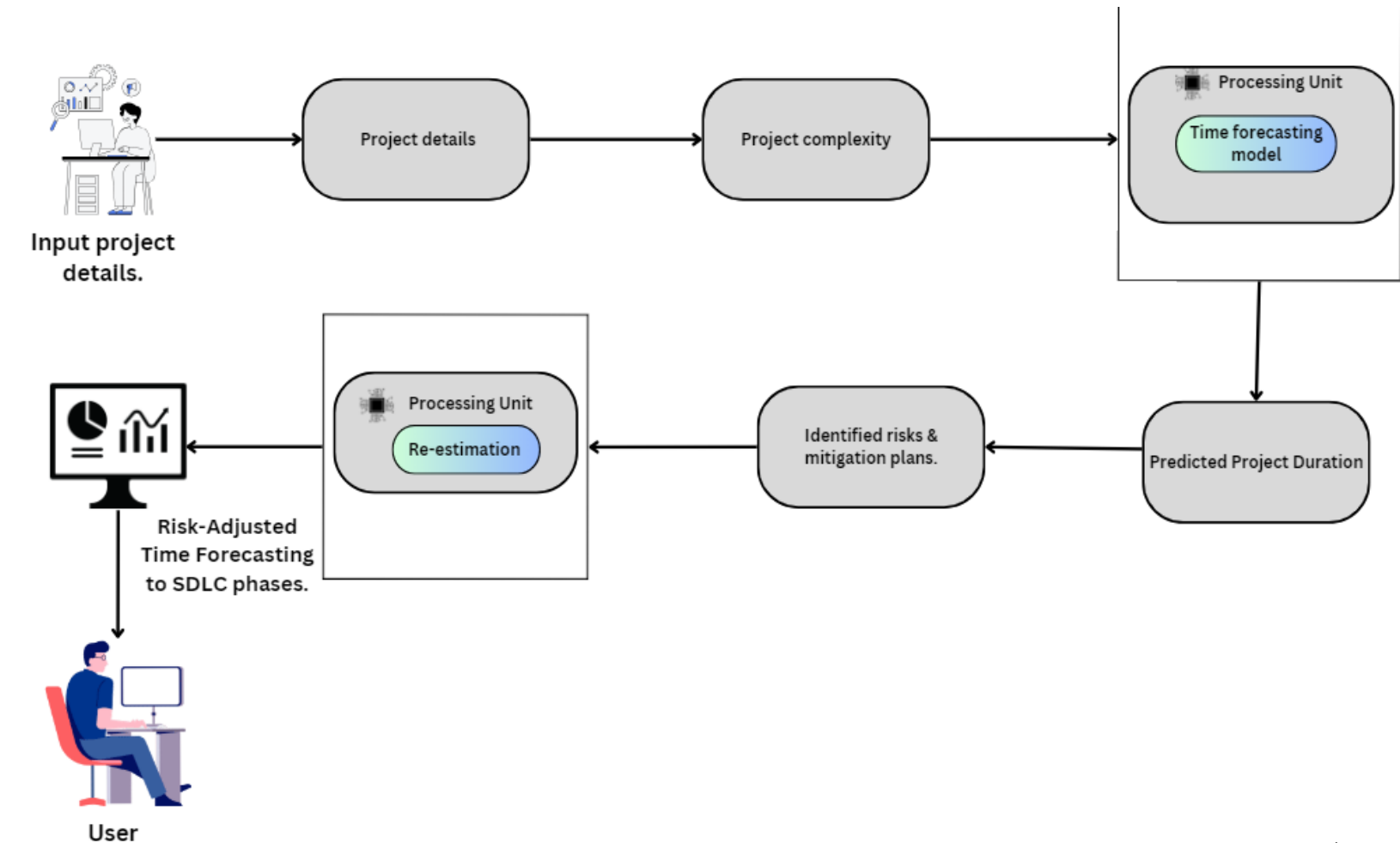
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OVERVIEW DIAGRAM



PREVIOUS

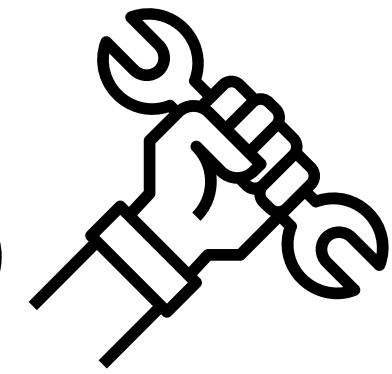
VS



CURRENT



TOOLS & TECHNOLOGIES



Data Collection Tools

- Kaggle

Exploratory Data Analysis(EDA) Tools

- Python/R with Pandas
- Jupyter Notebooks

Machine Learning Techniques

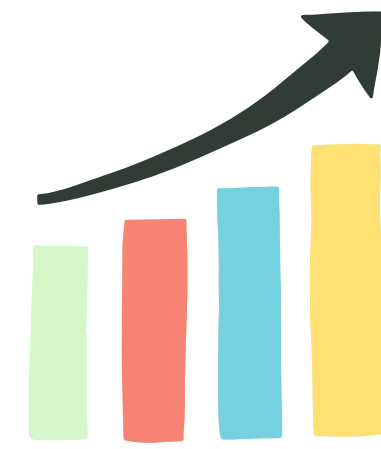
- Gradient Boost Algorithm
- Python libraries like Scikit-learn
- Hyperparameter Tuning



Testing and Validation Techniques:

- Mean Absolute Error (MAE) to assess the precision of the time estimates.
- Root Mean Squared Error (RMSE) for evaluating prediction accuracy.
- R-Squared to measure the goodness-of-fit for the model.

CURRENT PROGRESS



- Data gathering from Kaggle.
- Backend completed in Time duration prediction.
- Frontend for time duration prediction.

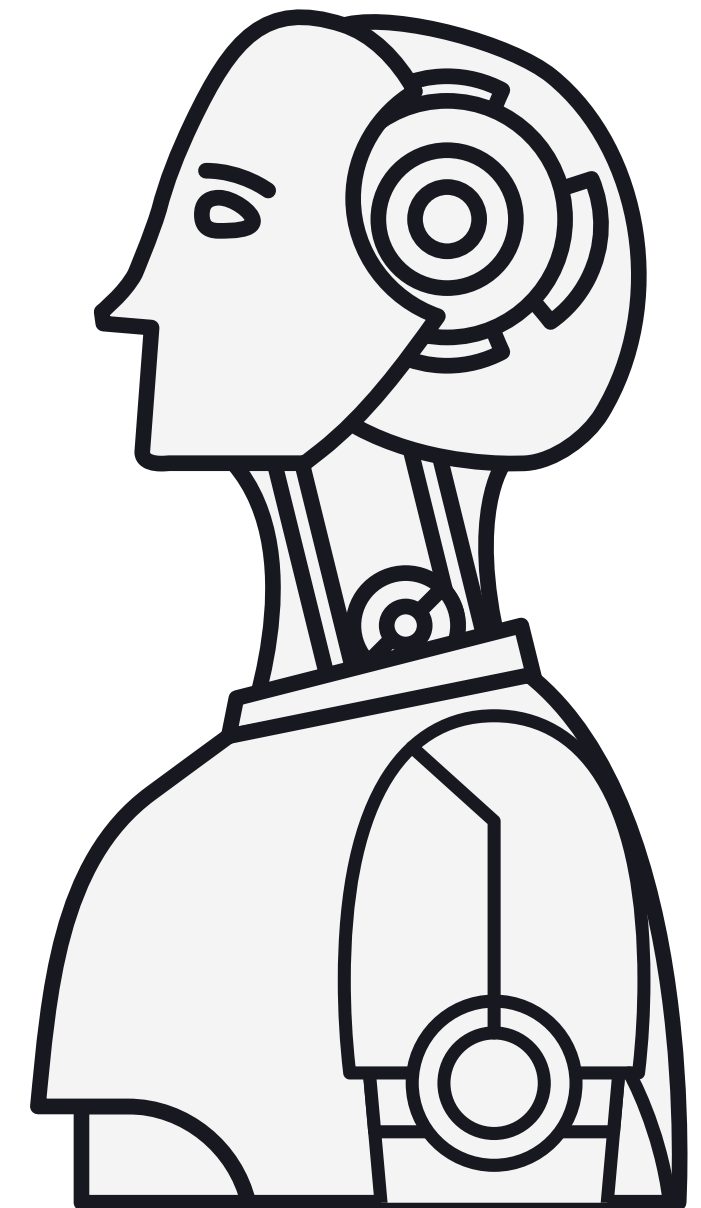


Group ID: RP24_002

FUTURE PROGRESS



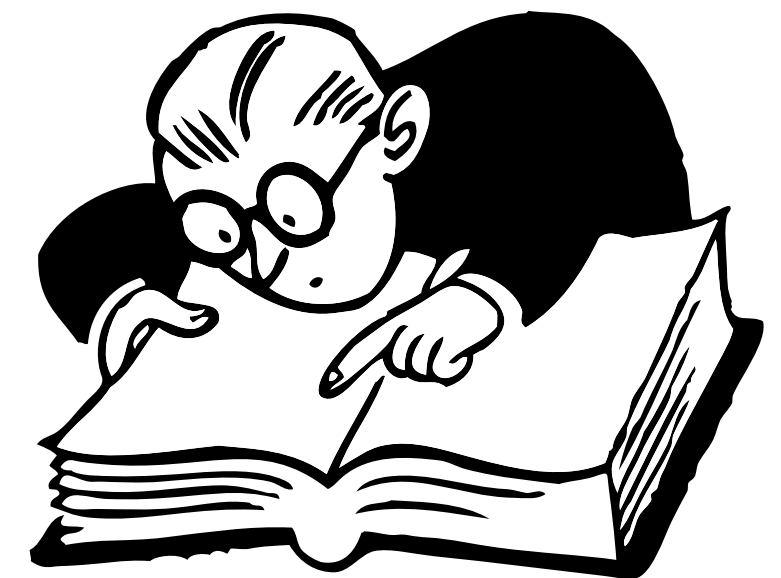
- Develop Risk Adjusted Time Forecast according to SDLC phases.
- Develop another Time Forecasting model adjusting to mitigation plans identified according to SDLC phases.



REFERENCES



- N. Mittas and L. Angelis, "A systematic literature review on machine learning techniques for software effort estimation, " Information and Software Technology, vol. 80, pp. 185-204, 2016.
- G. Schicker, S. Figl and R. Felderer, "Identification and evaluation of cost drivers in agile software development, " in Proceedings of the Evaluation and Assessment in Software Engineering, 2020, pp. 268-277
- J. Wen, S. Wang, X. Li, Z. Lin and Y. Hu, "Leveraging Machine Learning Techniques for Software Effort Estimation: A Systematic Mapping Study, " in IEEE Access, vol. 10, pp. 4340-4371, 2022

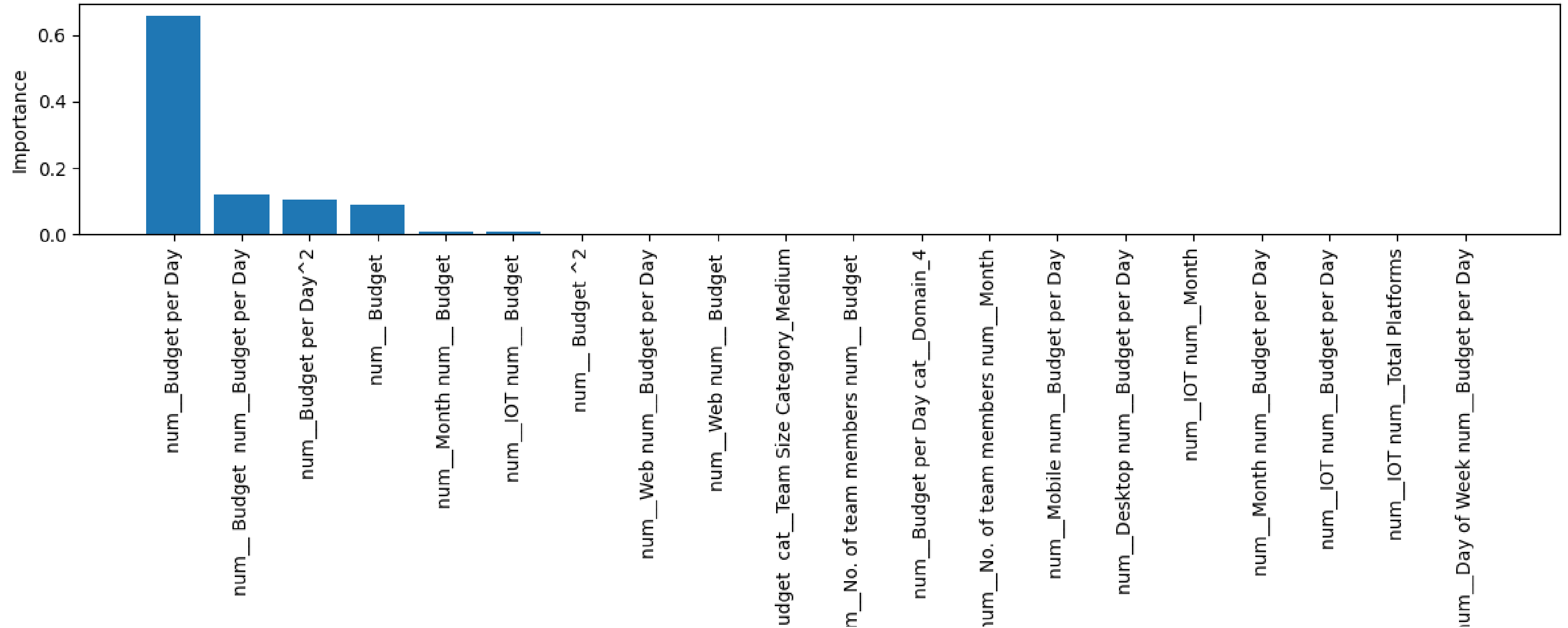


Group ID: RP24_002

PROJECT EVIDENCE



Top 20 Feature Importance



PROJECT EVIDENCE



Linear Regression Performance:

RMSE: 24.59

R2 Score: 0.76

MAE: 20.18

```
/opt/conda/lib/python3.10/site-packages/sklearn/preprocessing/_encoders.py:868: FutureWarning: `sparse` was renamed to `sparse_output` in version 1.2 and will be removed in 1.4. `sparse_output` is ignored unless you leave `sparse` to its default value.
```

```
warnings.warn(
```

```
/opt/conda/lib/python3.10/site-packages/sklearn/preprocessing/_encoders.py:868: FutureWarning: `sparse` was renamed to `sparse_output` in version 1.2 and will be removed in 1.4. `sparse_output` is ignored unless you leave `sparse` to its default value.
```

```
warnings.warn(
```

Random Forest Performance:

RMSE: 6.99

R2 Score: 0.98

MAE: 4.40

```
/opt/conda/lib/python3.10/site-packages/sklearn/preprocessing/_encoders.py:868: FutureWarning: `sparse` was renamed to `sparse_output` in version 1.2 and will be removed in 1.4. `sparse_output` is ignored unless you leave `sparse` to its default value.
```

```
warnings.warn(
```

Gradient Boosting Performance:

RMSE: 4.78

R2 Score: 0.99

MAE: 3.34

SVR Performance:

RMSE: 49.22

R2 Score: 0.04

MAE: 43.27

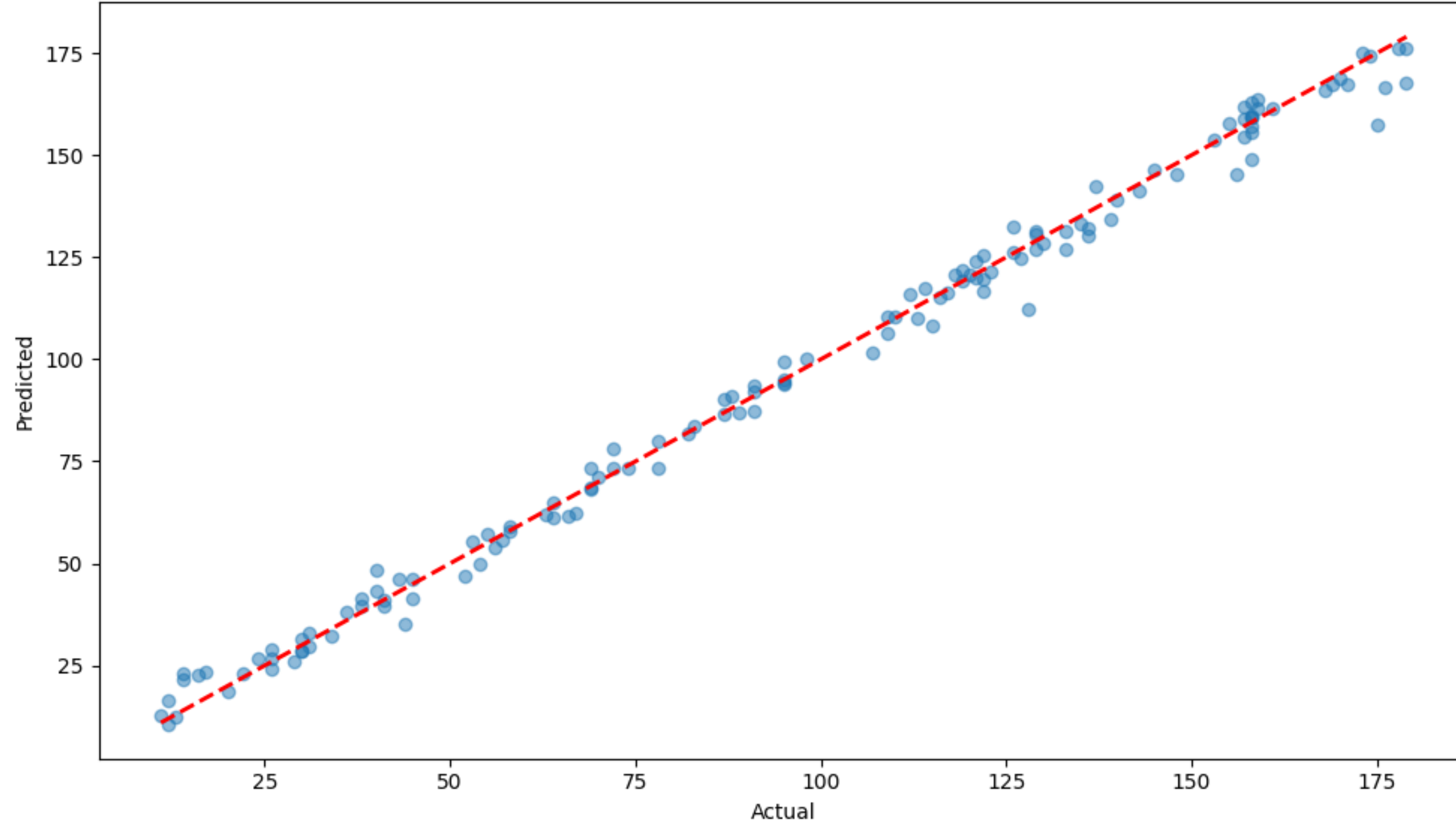
```
/opt/conda/lib/python3.10/site-packages/sklearn/preprocessing/_encoders.py:868: FutureWarning: `sparse` was renamed to `sparse_output` in version 1.2 and will be removed in 1.4. `sparse_output` is ignored unless you leave `sparse` to its default value.
```

```
warnings.warn(
```

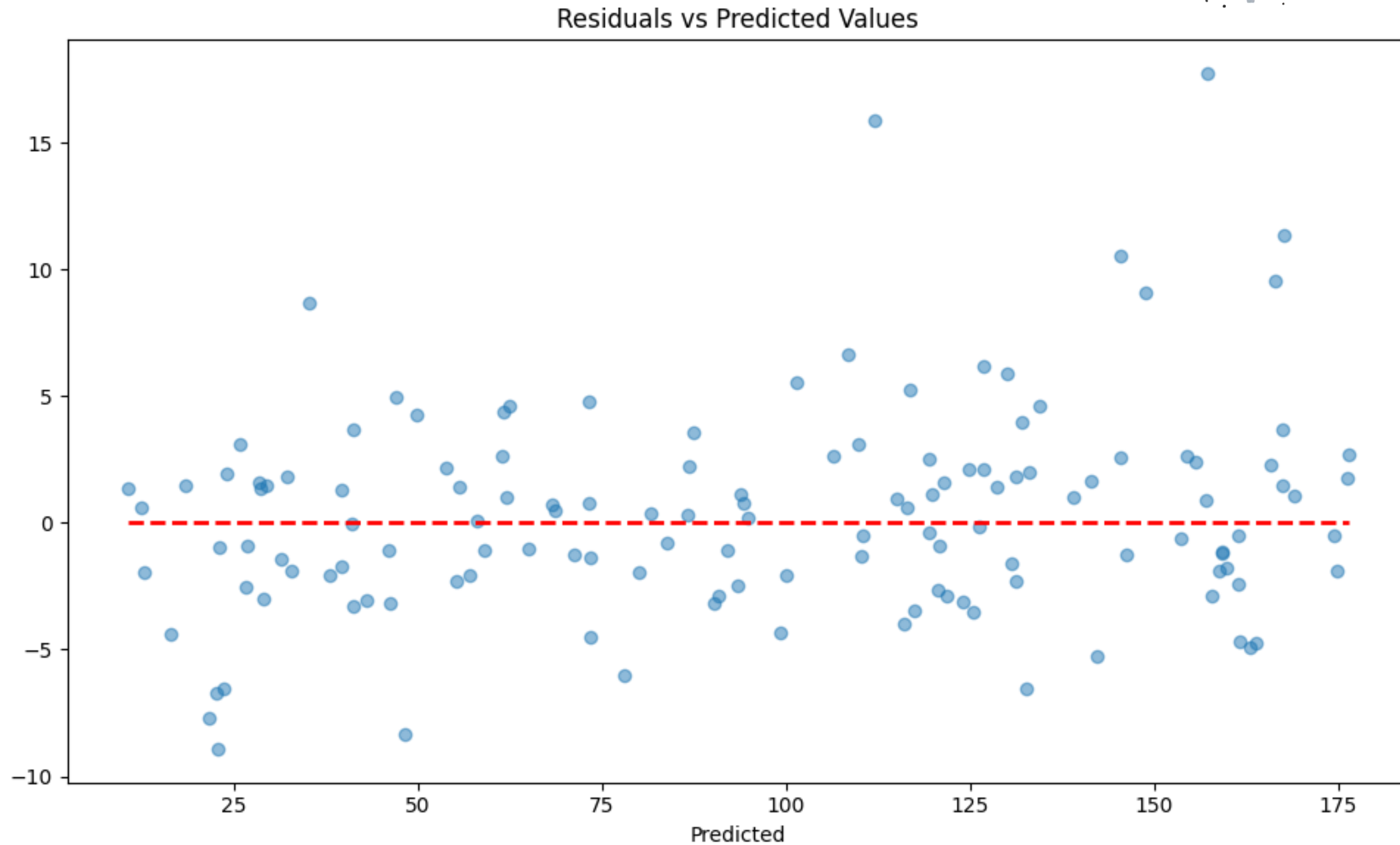
PROJECT EVIDENCE



Actual vs Predicted Project Duration



PROJECT EVIDENCE



COMMENT ADDRESSED

Comment in PP1

- Validations needed to be added.
- Component Integration.

Changes done

- Added Validations to both frontend and Backend
- Web application development

- **BRANDING**
- **BUSINESS PLAN**
- **BUSINESS MODEL CANVAS**



BRANDING

- Create a social media marketing plan
- Recognizing the target audience
- Provider revenue model facilities
 - Ad – Based Revenue
 - Subscription Revenue



BRANDING

Starter	Value	Pro
Trial Free 20 Users Live Dashboard Real time notifications	Enterprise \$50 Unlimited Users Advanced Reporting Less Time Prediction Web Application Bio Metrics Authentications	Premium \$145 Unlimited Users Advanced Reporting Less Time Prediction Bio Metric Authentication

Annual / Monthly

Group ID: RP24_002

BUSINESS PLAN

Partners	Activities	Values	Relationships	Customers
Technology Vendors	Sales & marketing	Real Time information Disclosure	User Support	Organizations
Cloud Providers	Platform Development & Maintanance			Specific Collectors
Data Providers	Resources	Fast & Acccurate access to data	Channels	
			Social Media	
	Web Application		Revenue	Add Revenue
				Subscription Revenue

THANK YOU !

