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1. INTRODUCTION

1.1 INTRODUCTION

The "Owner Identification of Embossed Number Plate Vehicles through Optical Character Recognition using K-Nearest Neighbors" project aims to develop a webbased system that can accurately identify the owners of vehicles by recognizing the embossed number plates on their vehicles using optical character recognition technology.

The system uses optical character recognition (OCR) to extract the alphanumeric characters from the number plate image and then use the K-Nearest Neighbors (KNN) algorithm to match these characters with the database of registered vehicle owners. A database is utilized to store and manage the information of registered vehicle owners. The database serves as a crucial component that enables efficient and accurate retrieval of owner details based on the recognized characters from the number plates.

The KNN algorithm is a popular machine learning algorithm involves using a machine learning approach to classify or analyze vehicles based on their proximity to others in the dataset. It works by finding the K closest neighbors to a given data point in a feature space and classifying the data point based on the majority class of its neighbors. In this project, the feature space will be the set of extracted characters from the number plate image, and the class labels will be the registered vehicle owners. It is an algorithm based on regression and classification problems, and it has the advantages of easy implementation and fast training speed.

The dataset used for training and testing has been collected manually. The system is trained using a dataset of labeled number plate images. On passing a number plate image to the OCR system, the numbers are classified through KNN algorithm and the owner information is shown after a database lookup.

1.2 PROBLEM STATEMENT

This project aims to solve the manual identification of vehicle owners through their embossed number plates.

- The process of identifying the owner of a vehicle involves manually checking the embossed number plate against a database of registered vehicle owners can be time-consuming, error-prone, and dependent on the capability of the person performing the check.
- The existing system faces challenges such as variations in number plate formats, diverse terrains, and environmental conditions.
- The lack of a robust, automated identification system hampers efforts to combat vehiclerelated crimes and optimize transportation systems.
- In Nepal, the current manual processes for vehicle owner identification and monitoring lack efficiency, hindering effective law enforcement, traffic management, and ensuring public safety.

1.3 OBJECTIVES

The main objectives of this project are as follows:

- To develop an Optical Character Recognition (OCR) system for recognizing the embossed numbers on vehicles' number plates using KNearest Neighbors (KNN) algorithm.
- To implement the system as a web application to ease the lookup of a vehicle's ownership.
- To allow system to handle a large volume of embossed number plate data efficiently. This is crucial for implementation in urban areas or regions with high vehicular traffic.

1.4 SOFTWARE DEVELOPMENT METHODOLODY

The development methodology chosen for this project was incremental agile, which is an iterative approach that emphasizes delivering functional software in increments rather than all at once. The project is broken down into small modules, and each module is developed, tested, and deployed independently. The project team first identified the high-level requirements (user stories) and then divided them into smaller, more manageable tasks that could be completed in short iterations. During each iteration, the team developed a working prototype of the system that met the requirements for that particular iteration, and then they test and refine the prototype based on feedback. This approach allowed the team to quickly adapt to changing requirements, address issues as they occur, and deliver a working system in a timely and efficient manner.

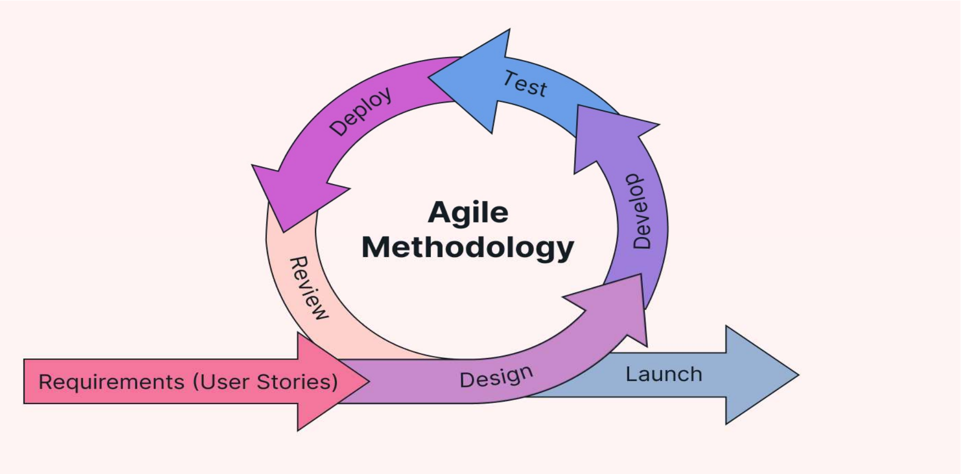


Figure 1: Agile Development Methodology

2. PROJECT ANALYSIS

2.1 PROCESS ANALYSIS

The analysis of processes aids in locating any roadblocks that could arise while carrying out a project. An appropriate project analysis can significantly reduce the organization's time expenditure. Strategic assessment and technical assessment are the two criteria for analysis. Whereas strategic evaluation is concerned with what we do and for whom, it also serves as a framework for assessing and managing projects. And last, how do we succeed. Similar to this, technical assessment entails supplying an organization with data regarding the advantages of introducing new technology as well as the profitability of its current technology.

2.2 BUDGET ANALYSIS

The budgetary analysis identifies the components of budget expenditure and revenue in a budget. It includes economic assessment which can be done in following ways:

- Present Worth Analysis
- Future Worth Analysis
- Annual Worth Analysis
- Internal Rate of Return
- Payback period
- Net Profit
- Uniform Gradient Cash Flow

2.2.1 Present Worth Analysis

Present value (PV) is the current value of an expected future stream of cash flow. The formula to calculate the present worth is as below:

Different Cash flow for n years

Uniform Cash flow

$$PW(i) = -P + C_1[\frac{1}{(1+i)^1}] + C_2[\frac{1}{(1+i)^2}] + C_j[\frac{1}{(1+i)^j}] + C_n[\frac{1}{(1+i)^n}] - S[\frac{1}{(1+i)^n}]$$

(i) = - P +A(P / A, i% n)

Where, $(\mathrm{P/A}, \mathrm{i}\%, \mathrm{n}) = [\frac{(1+\mathrm{i})^{\mathrm{n}}-1}{\mathrm{i}*(1+\mathrm{i})^{\mathrm{n}}}]$

Here,

- P: Initial investment
- n: Number of years
- i: Interest Rate
- C: Cash inflow of a year, R for Revenue dominated cash flow
- A: Annual Cash flow/ Revenue
- S: Salvage Value

The formula for calculating PV in Excel is =PV(rate, nper, pmt, [fv], [type]).

If FV is omitted, PMT must be included, or vice versa, but both can also be included. The inputs for the present value (PV) formula in excel includes the following:

- RATE = Interest rate per period
- NPER = Number of payment periods
- PMT = Amount paid each period (if omitted—it's assumed to be 0 and FV must be included)
- [FV] = Future value of the investment (if omitted—it's assumed to be 0 and PMT must be included)
- [TYPE] = When payments are made (0, or if omitted—assumed to be at the end of the period, or 1—assumed to be at the beginning of the period)

2.2.2 Future Worth Analysis

FV measures how much a given amount of money will be worth at a specific time in the future.

The formula to calculate the future worth is as below:

Different Cash flow for n years

$$FW(i) = -P(1+i)^{n} + C_1(1+i)^{n-1} + C_2(1+i)^{n-2} + C_j(1+i)^{n-j} + C_n^{\,n} + S$$

Uniform Cash flow: (i) = - P +A(P / A, i% n) + A (F/A, i%, n)

Where, $(F/A, i\%, n) = [\frac{(1+i)^{n}-1}{i}]$ and (F/P, i%, n) = $(1 + i)^{n}$

Here,

- P: Initial investment
- n: Number of years
- i: Interest Rate
- C: Cash inflow of a year, R for Revenue dominated cash flow
- A: Annual Cash flow/ Revenue
- S: Salvage Value

The FV syntax in excel is as follows:

FV(rate, nper, pmt, [pv], [type])

Where:

- RATE = Interest rate per period
- NPER = Number of payment periods
- PMT = Amount paid each period (if omitted—it's assumed to be 0 and PV must be included)
- [PV] = Present value of the investment (if omitted—it's assumed to be 0 and PMT must beincluded)
- [TYPE] = When payments are made (0, or if omitted—assumed to be at the end of theperiod, or 1—assumed to be at the beginning of the period)

2.2.3 Annual worth Analysis

The annual worth is the net of all the benefits and costs incurred over a one-year period. Therefore, we present the net of all the different benefits and costs incurred at different points of time in a one-year period with one number, and we call it the annual worth.

The formula to calculate the future worth is as below:

$$AW = - (A / P, i\%, n) + S (A /F, i\%, n) \text{ or } AW = - (P – S) (A / P, i\%, n) – S * i$$

Where, $(A/P, i\%, n) = [\frac{i*(1+i)^{n}}{(1+i)^{n}-1}]$ and $(A/F, i\%, n) = [\frac{i}{(1+i)^{n}-1}]$

and the FV syntax in excel is as follows: -PMT(rate, nper, pv, [fv], [type])

2.2.4 Return of Investment (ROI)

ROI, or Return on Investment, is a common metric used in project management to evaluate the financial success of a project. In software project management, ROI can be used to measure the financial benefits that a project will bring to the organization. We can calculate the ROI using the following formula:

ROI = (Financial Benefits - Project Costs) / Project Costs

A positive ROI indicates that the project will generate more financial benefits than its costs, while a negative ROI indicates that the project is not expected to be financially successful.

3. SCHEDULING

3.1 ACTIVITY PLANNING

A detailed plan for the project, must also include a schedule indicating the startand completion times for each activity.

3.1.1 Work Break Down Structure (WBS)

It uses Work Breakdown Structure (WBS) to generate a task list:

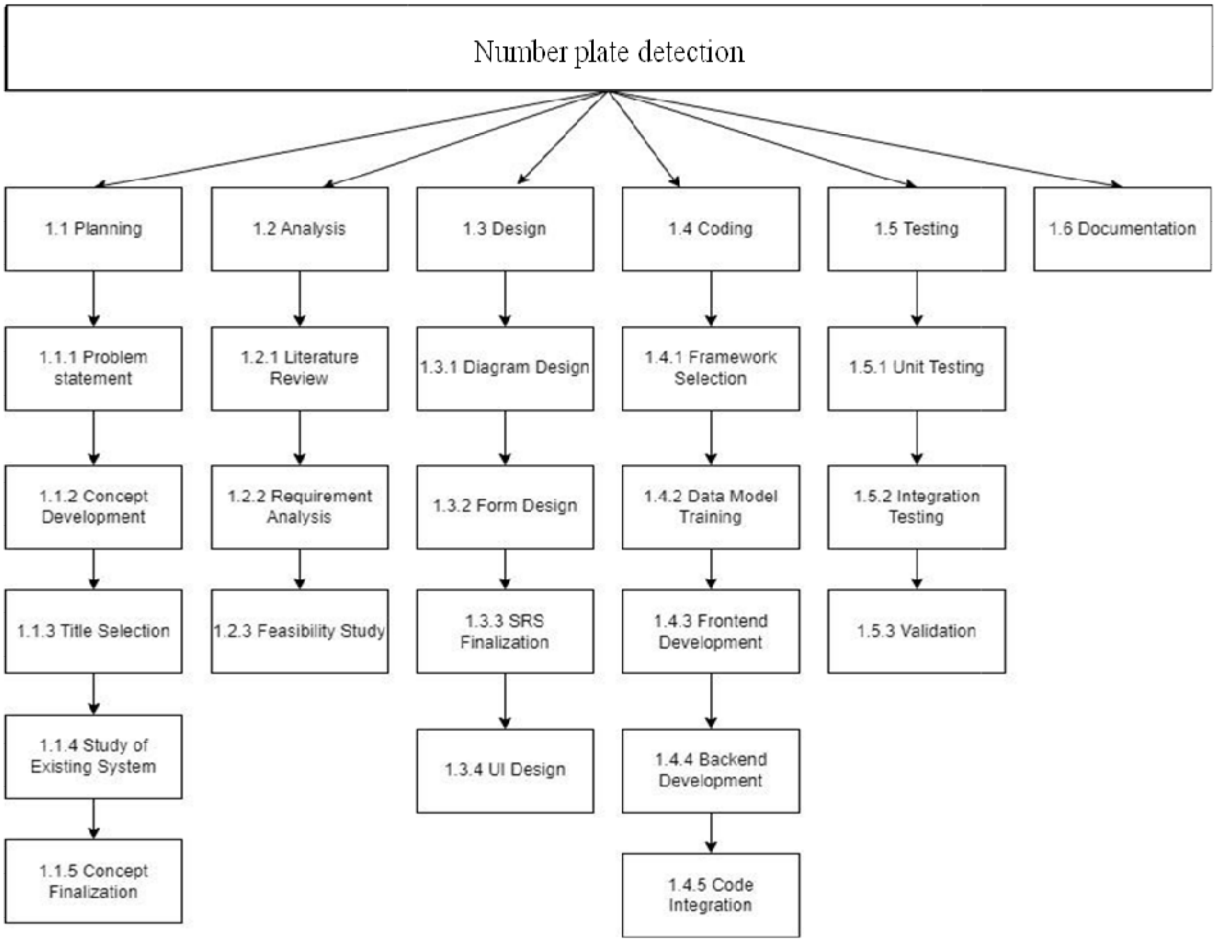


Figure 2: Work Breakdown Structure

3.1.2 Inserting Tasks

- From the view options, choose Gantt Chart option.
- Add the tasks in the Task Name column of the sheet. You can either copy & paste thetasks from another list or click in the text field and type the name of each task.

3.1.3 Creating Task Hierarchy

After the tasks have been input in order, we can put hierarchy in the task using indentation. We can either indent a task or out dent a task using the icons in “Schedule” section of the Task menu bar. When we indent a task, it becomes the subtask of the task above it. The more atask is indented the more its hierarchy decreases.

3.1.4 Defining Duration, Start Date and End Date

Defining start date and finish date are similar processes with a scheduling.

- Click on the start or finish date, then enter the date manually or select one from the date picker.
- After, selecting the start and end date, the duration will be automatically calculated based on the work-time provided.
- After assigning start and finish date for all of the tasks, the Gantt chart will be created on theright hand side as shown in the figure below.

3.1.5 Project Work Flow

A visual representation of the series of interconnected steps and activities within the license plate detection system, the project workflow diagram illustrates the seamless progression of tasks from data collection and algorithm processing to real-time recommendations, ensuring a systematic and efficient approach to for owner identification of embossed number plates.

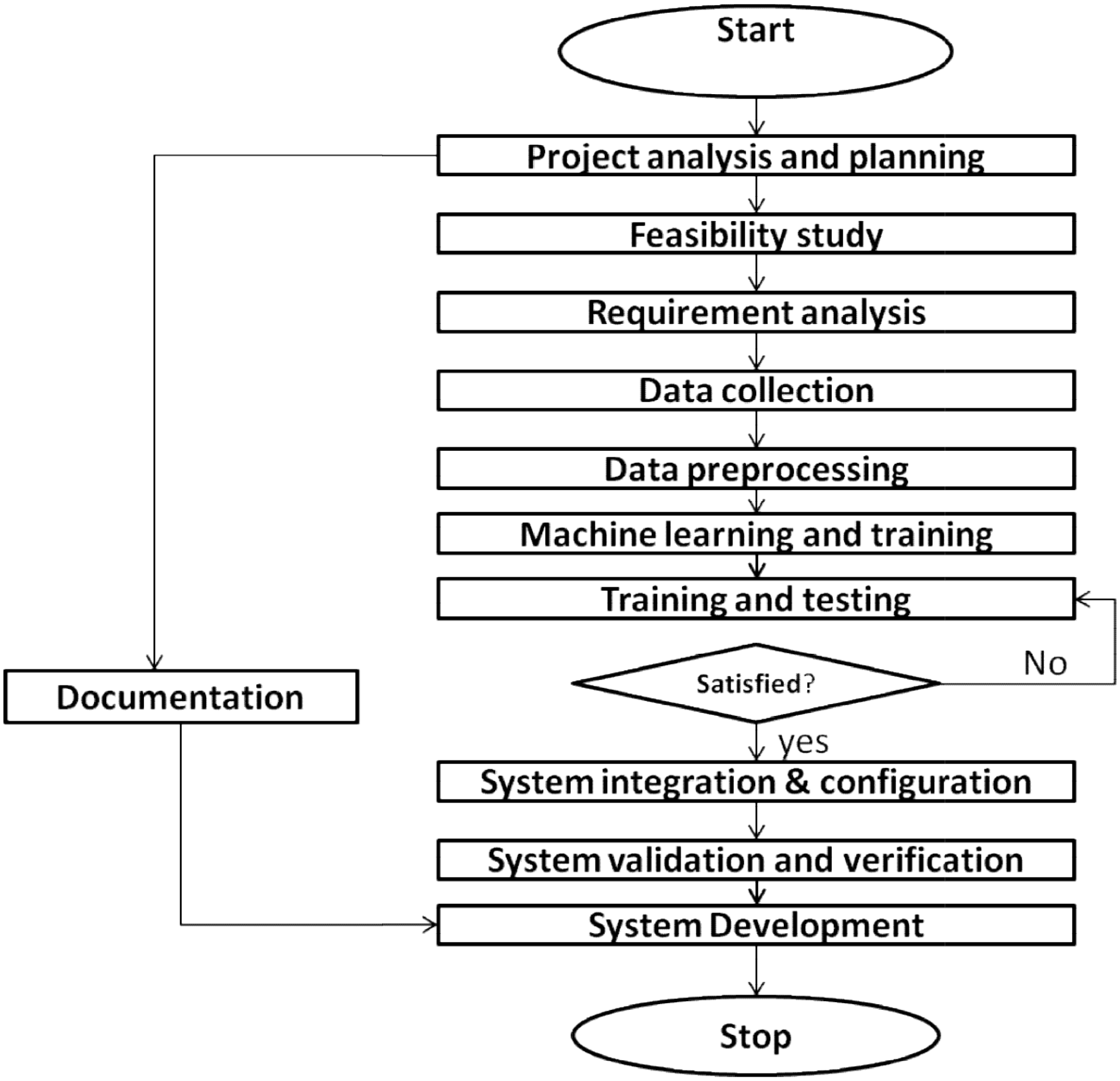


Figure 3: Project Work Flow

3.1.6 Task/ Activities Gantt chart

Gantt chart is a graphic representation of project activities, shown in a time-scaledbarline with no links shown between activities.

Table 1: Project Schedule Table

S.N.	Tasks	Duration	Start Date	End Date
1.	Requirement Gathering & Analysis	15	16-Oct	27-Oct
2.	Planning and Design	60	21-Oct	11-Dec
3.	Training Model	50	15-Nov	4-Jan
4.	Development	30	4-Jan	4-Feb
5.	Testing product	30	10-Jan	9-Feb
6.	Documentation	122	16-Oct	17-Feb

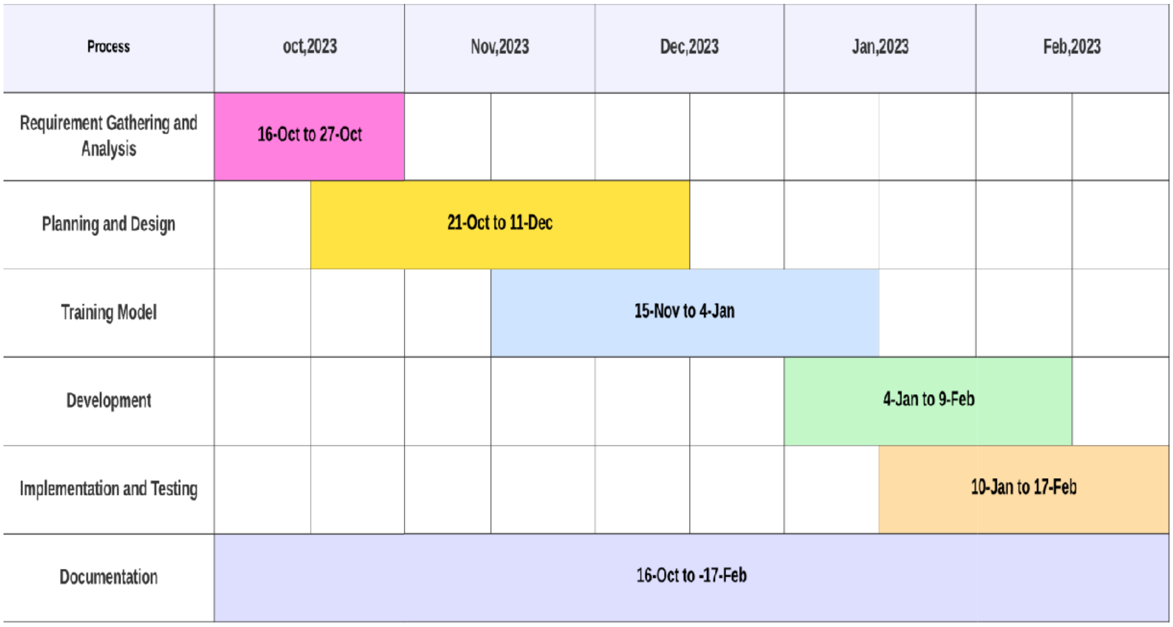


Figure 4: Gantt chart

4. RISK ANALYSIS

4.1 RISK EXPOSURE

Risk exposure is a measure of the potential impact that a risk event could have on a project or organization. It is calculated by multiplying the probability of the risk occurring by the impact that it would have if it did occur. There are several metrics that can be used to measure risk exposure, including:

- **Probability:** The likelihood of a risk event occurring. This can be measured on a scale of 0 to 1, with 0 indicating no chance of the risk event occurring and 1 indicating a certainty that the risk event will occur.
- **Impact:** The potential consequences of a risk event if it were to occur. This can be measured in terms of financial impact, time impact, or impact on project quality or performance.
- **Risk Exposure:** The potential impact of a risk event, calculated as the product of its probability and impact. This provides a quantitative measure of the risk's potential impact on the project or organization.
- **Risk Severity:** The seriousness of a risk event, based on its potential impact & the likelihood of it occurring. This can be measured on a scale of low, medium, or high.

By using these metrics, project managers can gain a better understanding of the potential impact of a risk event on their project or organization.

Example:- Assume this software project has identified a risk event where there is a 30% chance that the project will experience a delay due to a shortage of resources. The impact of the delay is estimated to be a cost of $500 in additional resources and lost revenue.

To calculate the risk exposure, we would multiply the probability and impact as follows:

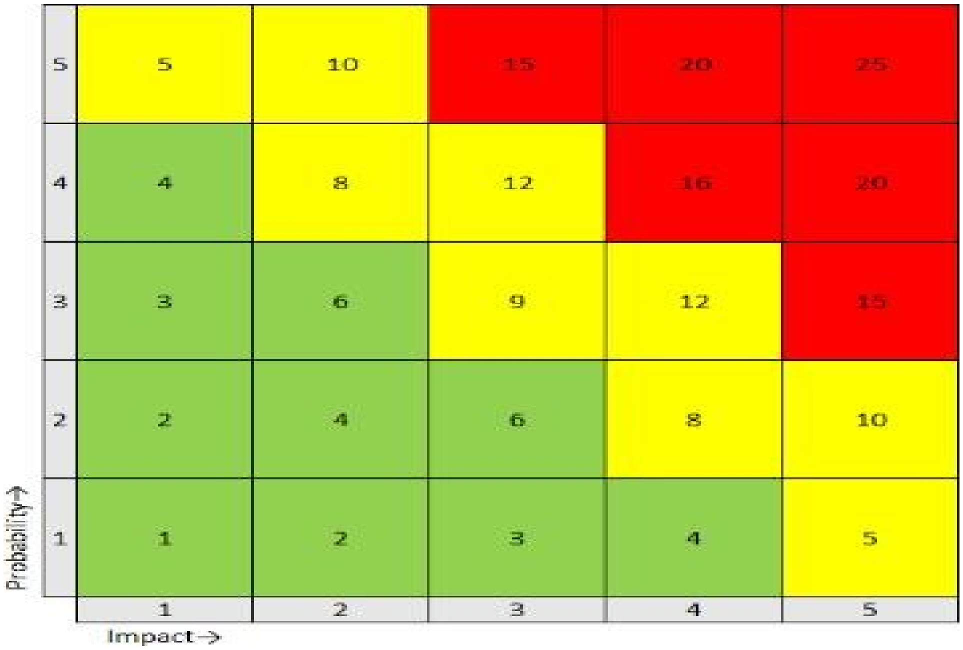
- Risk Exposure = Probability x Impact
- Risk Exposure = 30% x $500
- Risk Exposure = $150

This means that if the risk were to occur, it could cost the project or organization up to $150 in additional expenses or lost revenue.

By calculating risk exposure for different risk events, project managers can prioritize their risk mitigation efforts based on the risks that have the highest potential impact on the project or organization.

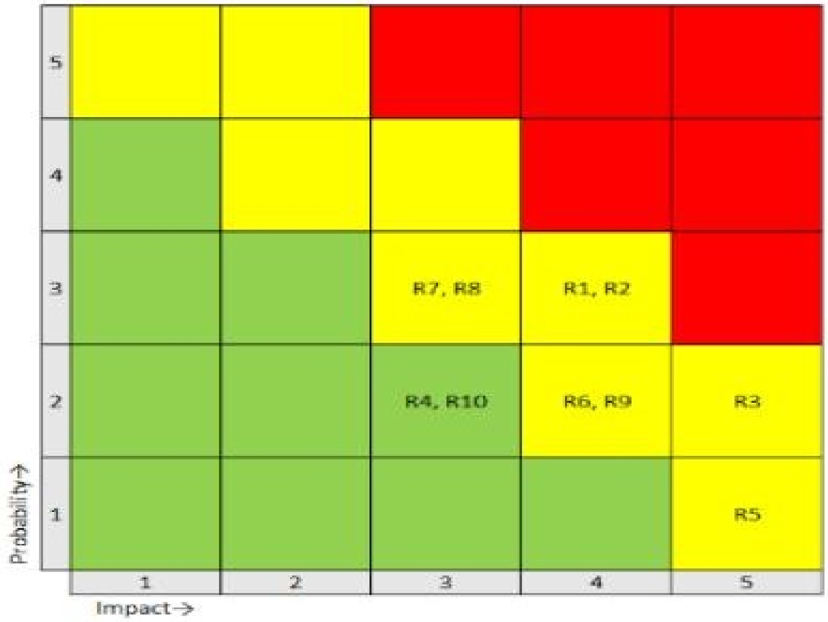
4.2 ILLUSTRATION WITH MS EXCEL

We have identified 10 potential risks that could impact our system. The probability and impact scores are assigned on a scale of 1 to 5, with 1 being low and 5 being high. The risk exposure score is calculated by multiplying the probability and impact scores, while the priority score is assigned on a scale of 1 to 5, with 1 being low priority and 5 being high priority.



Probability→					
5	5	10	15	20	25
4	4	8	12	16	20
3	3	6	9	12	15
2	2	4	6	8	10
1	1	2	3	4	5
Impact→	1	2	3	4	5

In this graph, the impacts are plotted on the x-axis, while the probability scores are plotted on the y-axis. The bars are color-coded based on the risk exposure scores, with red bars indicating high-priority risks, yellow bars indicating medium-priority risks, and green bars indicating low-priority risks.



5	🟨	🟨	🟥	🟥	🟥
4	🟩	🟨	🟨	🟥	🟥
3	🟩	🟩	🟨 R7, R8	🟨 R1, R2	🟥
2	🟩	🟩	🟩 R4, R10	🟨 R6, R9	🟨 R3
Probability→ 1	🟩	🟩	🟩	🟩	🟨 R5
	1	2	3	4	5
	Impact→				

From this graph, we can see that there are no highest-priority risks. R1, R2, R3, R5, R6, R7, R8, R9 are the highest-priority risks, which have the risk exposure scores of 12, 12, 10, 5, 8,9, 9 and respectively. In contrast, R4 AND R10 are the lowest-priority risks, both with risk exposure scores of 6.

5. RESOURCE ALLOCATION

5.1 DEFINITION

Effective resource allocation and scheduling are critical components of project management, as they ensure that tasks are completed on time and within budget. Resource allocation involves assigning the necessary resources, such as materials, employees, and equipment, to project activities based on their availability and the project timeline.

5.2 RESOURCE SMOOTHING

Resource smoothing is a project management technique that aims to balance resource utilization throughout the project timeline, avoiding peaks and valleys of demand. This process involves analyzing the project schedule to identify periods of high resource demand orover-allocation of resources and adjusting the schedule by delaying non-critical activities or reassigning resources.

5.3 RESOURCE LEVELING

Resource leveling is a project management technique that aims to balance the demand for resources with the available supply. This process involves analyzing the project schedule to identify periods of over- or under- allocation of resources and adjusting the schedule to align the demand for resources with the available supply. By leveling resources, project managers can reduce the risk of delays, overburdening team members, and exceeding the allocated budget.

5.4 ILLUSTRATION IN MICROSOFT PROJECT

To illustrate resource allocation in MS Project, you need to schedule tasks, schedule resources, and allocate resources to the tasks in the project plan while considering resource availability and project timeline. This ensures that the project is completed on time, within budget, and with the necessary resources.

5.4.1 Schedule Tasks

First open task sheet and insert task name, duration, start-date, end-date, predecessor.

5.4.2 Schedule Resources

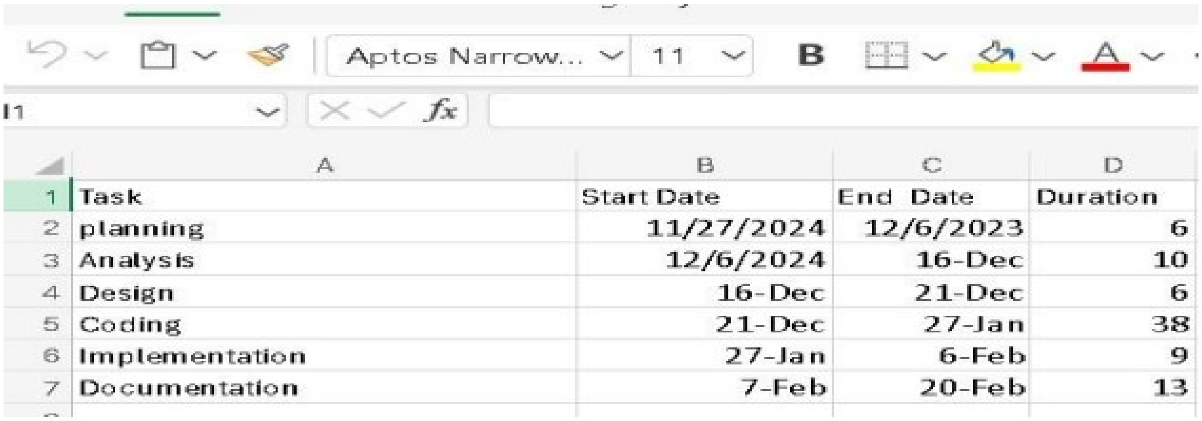
Open Resource Sheet and insert and set Resource Name, Type, Material, Group, Max (Capacity), Standard Rate, Over-Time Rate, Cost per Use, and Base Calendar for the project. Initials will be generated and set automatically.

5.4.3 Allocate Resources to Activities

Go to Task Sheet and set Resource Column for the particular task. Resource column have list of all the resources as drop down.

5.5 NETWORK PLANNING

Network planning model is an approach to scheduling which achieve this separation between the logical and the physical. There are various common models to calculate and evaluate project critical activities and critical path. Such as Critical path method(CPM), Program Evaluation Review technique(PERT) and Precedence Diagram method(PDM). Most commonly used technique isCritical Path Method (CPM).



	A	B	C	D
1	Task	Start Date	End Date	Duration
2	planning	11/27/2024	12/6/2023	6
3	Analysis	12/6/2024	16-Dec	10
4	Design	16-Dec	21-Dec	6
5	Coding	21-Dec	27-Jan	38
6	Implementation	27-Jan	6-Feb	9
7	Documentation	7-Feb	20-Feb	13

Figure 5: Task Scheduling

6. MONITORING AND CONTROLLING

There are a range of monitoring and control techniques that can be used by project managers, including collecting data progress, Cost monitoring, and Earned value Analysis.

6.1 EARN VALUE ANALYSIS

Earned Value Analysis (EVA) helps to track the progress of a project by measuring the actual value of the work completed against the planned value of the work scheduled to be completed at a given point in time. EVA calculates three key metrics. They are Planned Value (PV), Earned Value (EV), and Actual Cost (AC).

- **Planned Value (PV)** is the planned cost of the work that was scheduled to be completed up to a certain point in time in the project schedule. It is also called Budgeted Cost of Work Scheduled (BCWS).
- **Earned Value (EV)** is the value of the work that has been completed up to the same point in time. It is also called Budgeted Cost of Work Performed (BCWP).
- **Actual Cost (AC)** is the actual cost of the work that has been completed up to the same point in time. It is also called Actual Cost of Work Performed (ACWP).

Once these values are calculated, the following EVA metrics can be derived:

- **Schedule Variance (SV)** is the difference between the EV and PV, and it indicates whether the project is ahead of or behind schedule. SV = EV - PV.
- **Cost Variance (CV)** is the difference between the EV and AC, and itindicates whether the project is under or over budget. CV = EV - AC.
- **Schedule Performance Index (SPI)** is the ratio of EV to PV, and it indicatesthe efficiency of the project in terms of schedule. SPI = EV / PV.
- **Cost Performance Index (CPI)** is the ratio of EV to AC, and it indicatesthe efficiency of the project in terms of cost. CPI = EV / AC.

7. TESTING

For testing the project, we will be going through the series of test cases to check themodules of our project.

7.1 TEST CASES FOR UNIT TESTING

Table 2: Unit Testing

ID	Test Scenario	ExpectedOutcomeResult	Pass/Fail
T1	Upload Image	User should beable to uploadimage	Pass
T2	Test "Recognize" button	Responsive "Recognize" button	Pass
T3	Display image	Display image that is uploaded by theuser	Pass
T4	Display detected number plate	Character stream of License numberplate should be displayed	Pass
T5	Display data	Details about ownership should be displayed when "Recognize" button is clicked	Pass

7.2 TEST CASES FOR SYSTEM TESTING

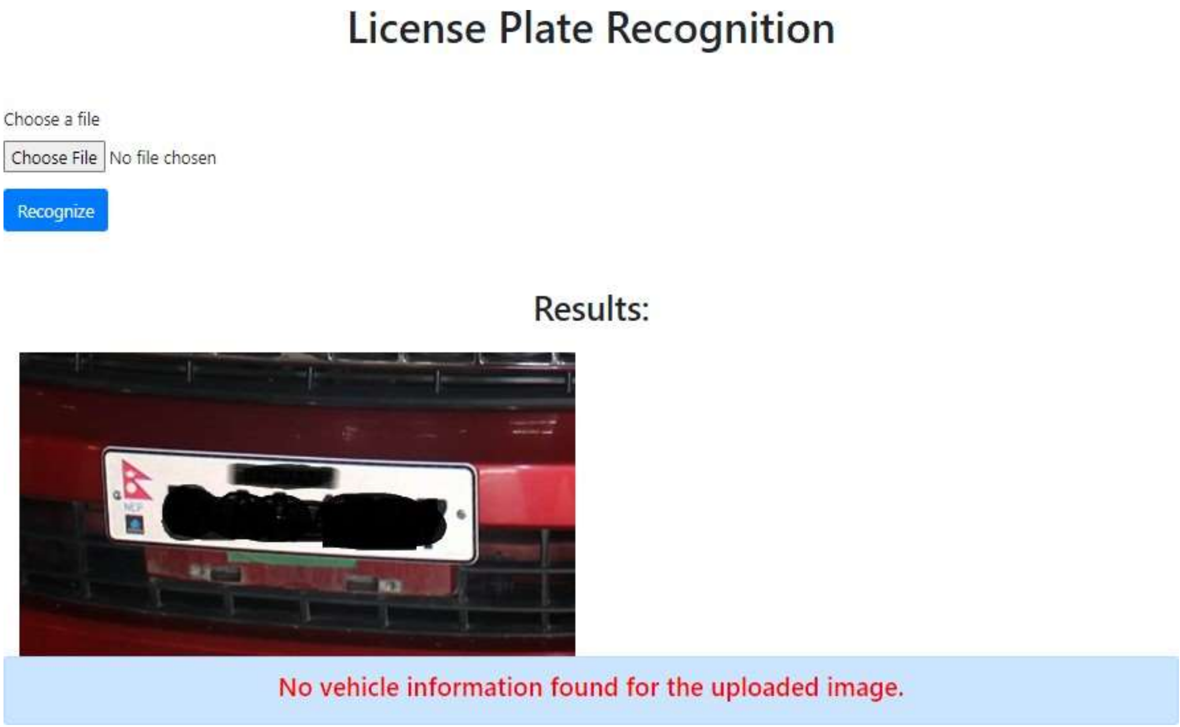
Test Case 1:

Test objectives: Test image if it recognizes number plate Test Data

Image data: skewedimage.jpg

Expected output: Unsuccessful in detecting the number plate.

Output:



No vehicle information found for the uploaded image.

Figure 6: Test Case 1

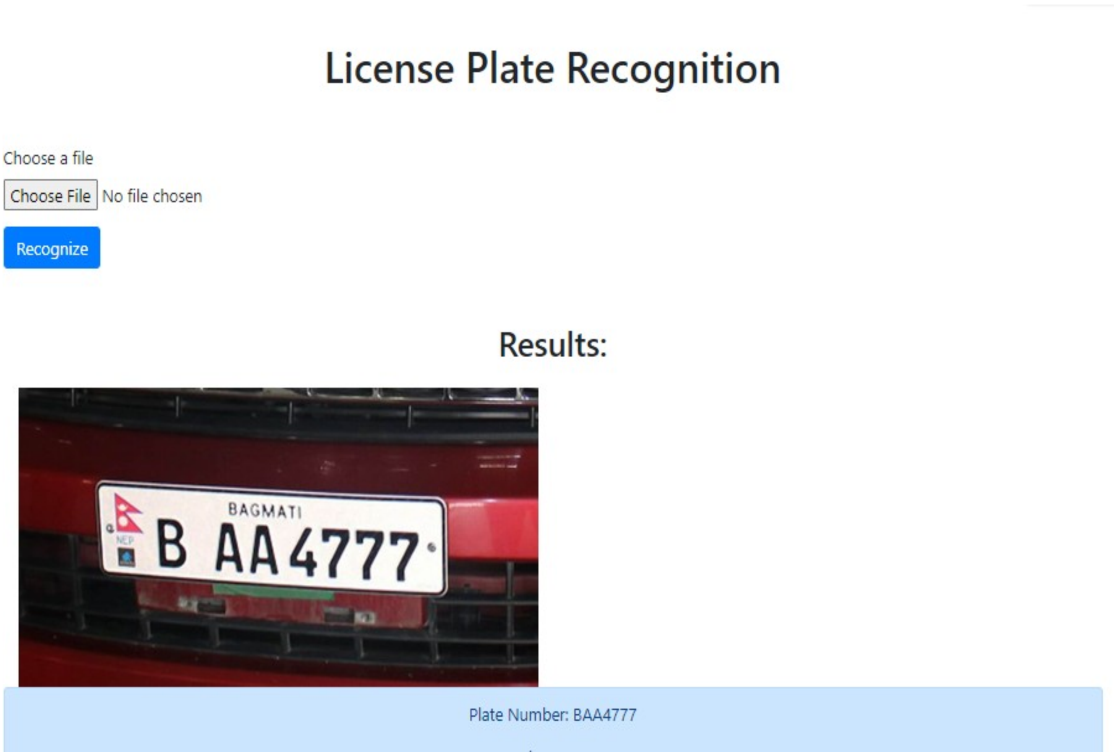
Test Case 2:

Test objectives: test image if it recognizes obstructed number plate Test Data:

Image data: success.jpg

Expected output: Successfully detected the number plate.

Output:



License Plate Recognition

Choose a file

Results:

Plate Number: BAA4777

Figure 7: Test Case 2

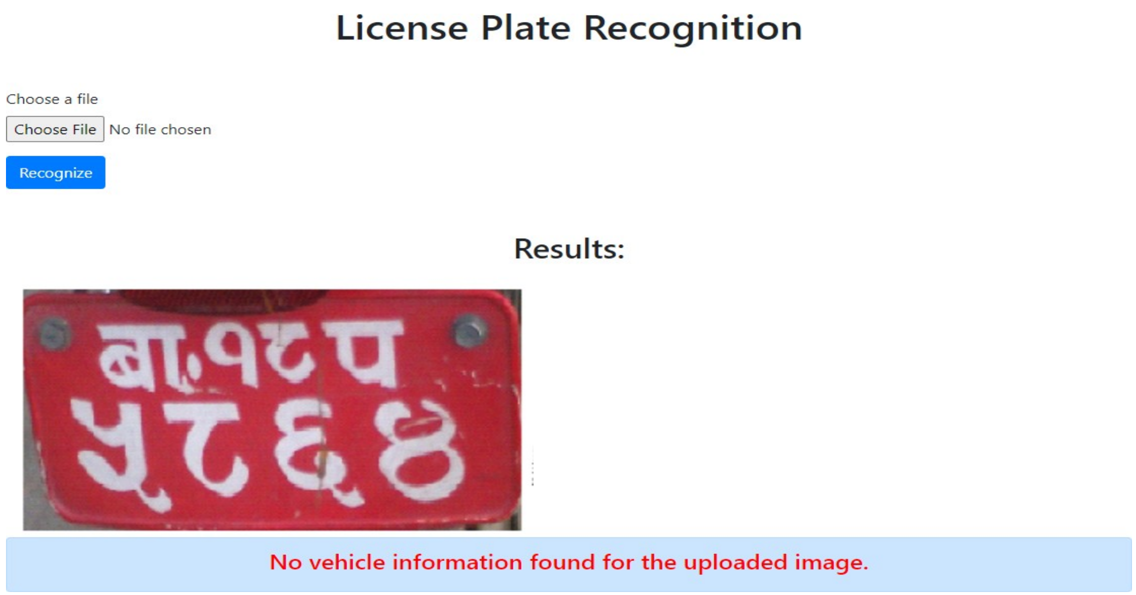
Test Case 3

Test objectives: Test Nepali handwritten number plate Test Data:

Image data: plates.jpg

Expected output: couldn't recognize the image.

Output:



License Plate Recognition

Results:

No vehicle information found for the uploaded image.

Figure 8: Test Case 3

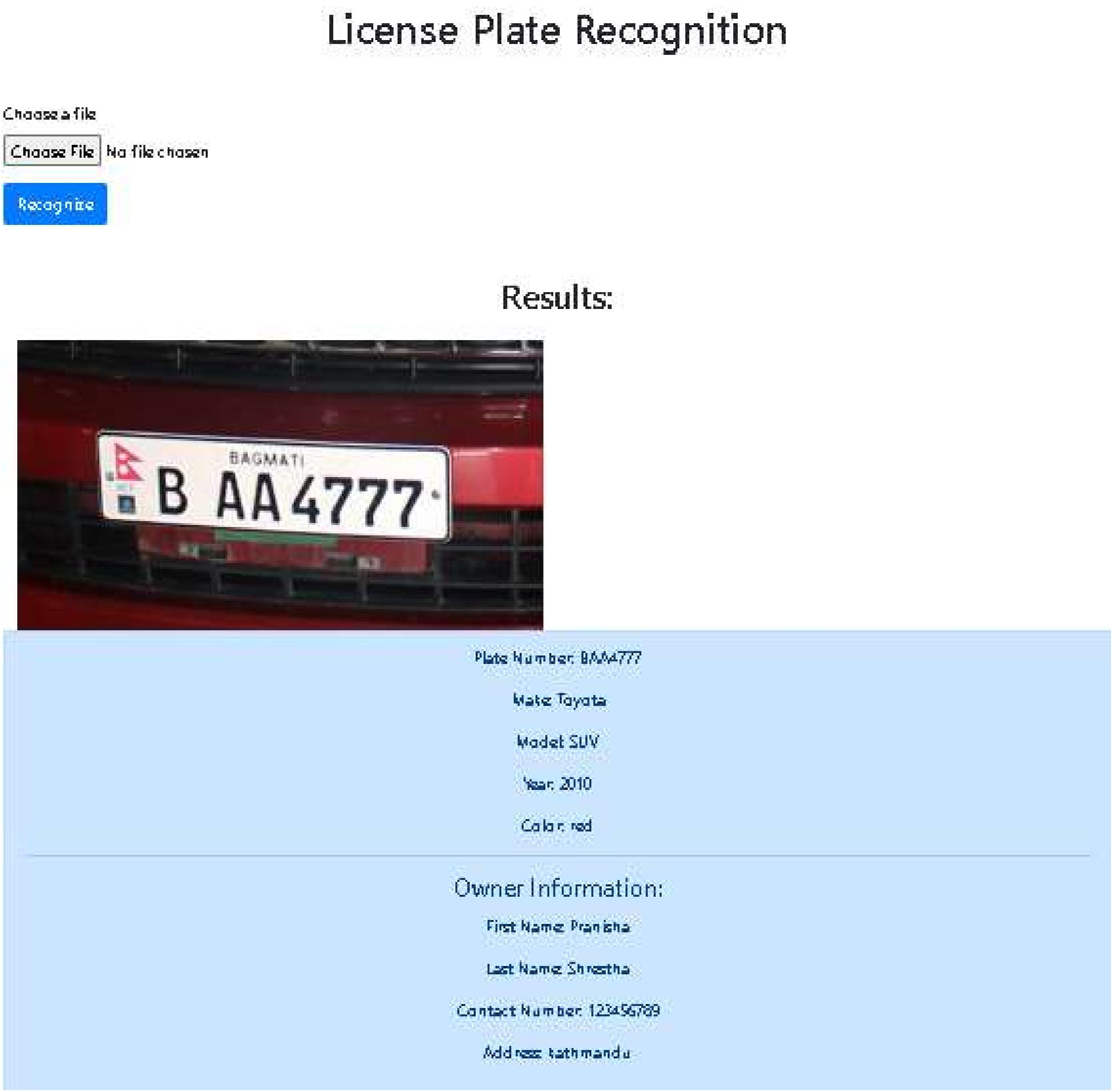
Test Case 4

Test objectives: Test whether vehicle and owner details is shown Test Data

Image data: nepali.jpg

Expected output: Successfully provided the vehicle and owner details.

Output:


License Plate Recognition

Choose a file

Choose File No file chosen

Recognize

Results:

Plate Number: BAA4777

Make: Toyota

Model: SUV

Year: 2010

Color: red

Owner Information:

First Name: Pranisha

Last Name: Shrestha

Contact Number: 123456789

Address: kathmandu

Figure 9: Test Case 4

7.3 RESULT ANALYSIS

Accuracy is a measure of how well our algorithm performs in terms of correctly identifying and segmenting characters. It represents the ratio of the number of correctly segmented characters to the total number of characters in the dataset. For our system, the accuracy is calculated as 75.0%. This means that our algorithm correctly segments 75% of the characters in the given dataset.

Accuracy is calculated as:

$$Accuracy = \frac{True\ Positives}{Total\ Instances} * 100$$

Precision quantizes the proportion of correctly segmented characters out of all the characters that our algorithm predicted as positive. It helps us understand the accuracy of positive predictions made by the system. In our case, the precision is 0.75, indicating that out of all the characters predicted as positive, 75% of them were correctly segmented.

Precision is given by the formula:

$$\text{Precision} = \frac{tp}{tp + fp}$$

Where:

- TP = True Positives
- FP = False Positives

Result:

Accuracy: 75.0 %

Precision: 75.0 %

8. VERSION CONTROL

Version control systems are a category of software tools that helps in recording changes made to files by keeping a track of modifications done in the code. The most popular example is Git, Helix core, Microsoft TFS.

8.1 Git

Among all version control system, we have chosen Git. Git is a distributed version control system. Git helps you keep track of code changes. Git is used to collaborate oncode.

1. **Git configuration:**

- **Git Config**

Get and set configuration variables that control all facets of how Git looks andoperates.

Set the name: $ git config --global user.name "User name"

Set the email: $ git config --global user.email "pranisa.shresth.001@gmail.com"

Check the setting**:** $ git config –list

Git alias

Set up an alias for each command:

$ git config --global alias.co checkout

$ git config --global alias.br branch

$ git config --global alias.ci commit

$ git config --global alias.st status

2. **Starting a project**

- **Git init**

Create a local repository: $ git init

- **Git clone**

Make a local copy of the server repository: $ git clone

3. **Local changes**

- **Git add**

Add a file to staging(Index) area: $git add Filename

Add all files as repo to staging(Index)area:$git add

- **Git commit**

Record or snapshots the file permanently in the version history with a message**:**

$git commit -m " Commit Message"

4. **Track changes**

- **Git diff**

Track the changes that have not been staged: $ git diff

Track the changes that have staged but not committed: $ git diff --stagedTrack the changes after committing a file: $ git diff HEAD

Track the changes between two commits: $ git diff

- **Git Diff Branches**

$ git diff < branch 2>

- **Git status**

Display the state of the working directory and the staging area: $ git status · **Git show Shows objects:** $ git show

5. **Commit History**

- **Git log**

Display the most recent commits and the status of the head: $ git log Display the output asone commit per line: $ git log -oneline

Displays the files that have been modified: $ git log – stat

Display the modified files with location: $ git log -p

6. **Ignoring files**

- **Git ignore**

Specify intentionally untracked files that Git should ignore.

Create .gitignore: $ touch .git ignore

List the ignored files: $ git ls-files -i --exclude-standard

7. Branching

- **Git branch**

Create branch:$ git branch List Branch: $ git branch –listDelete a Branch: $ git branch -d

Delete a remote Branch: $ git push origin -delete Rename Branch:$ git branch -m

- **Git checkout** –

Switch between branches in a repository. Switch to a particular branch:$ git checkout

Create a new branch and switch to it: $ git checkout -b Checkout a Remote branch: $ git checkout

8. Merging

- **Git merge**

Merge the branches: $ git merge

Merge the specified commit to currently active branch: $ git merge

- **Git rebase**

Apply a sequence of commits from distinct branches into a final commit: $ git rebase

Continue the rebasing process: $ git rebase -continue

Abort the rebasing process:$ git rebase--skip

- **Git interactive rebase**

Allow various operations like edit, rewrite, reorder, and more on existing commits: $ git rebase –i

9. Remote

- **Git remote**

Check the configuration of the remote server: $ git remote –v

Add a remote for the repository:$ git remote add

Fetch the data from the remote server: $ git fetch

Remove a remote connection from the repository: $ git remote rm

Rename remote server: $ git remote rename

Show additional information about a particular remote: $ git remote show

Change remote: $ git remote set-url

- **Git origin master**

Push data to the remote server: $ git push origin master

Pull data from remote server: $ git pull origin master

10. Pushing Updates

- **Git push**

Transfer the commits from your local repository to a remote server. Push data to the remote server: $ git push origin master

Force push data: $ git push -f

Delete a remote branch by push command: $ git push origin -delete edited

11. Pulling updates

- **Git pull**

Pull the data from the server: $ git pull origin master Pull a remote branch: $ git pull

- **Git fetch**

Download branches and tags from one or more repositories. Fetch the remote repository: $ git fetch< repository Url>

Fetch a specific branch: $ git fetch

Fetch all the branches simultaneously: $ git fetch -all Synchronize the local repository: $ git fetch origin

12. Undo changes

- **Git revert**

Undo the changes: $ git revert

Revert a particular commit: $ git revert

- **Git reset-** Reset the changes

$ git reset -hard

$ git reset -soft

$ git reset --mixed

13. Removing files

- **Git rm**

Remove the files from the working tree and from the index: $ git rm <file Name>

Remove files from the Git But keep the files in your local repository: $ git rm – cached

9. CONCLUSION

In this way the project on "Owner Identification of Embossed Number Plate Vehicles through Optical Character Recognition using K-Nearest Neighbors" has been successfully completed with the use of modern technologies and development methodologies. The project aimed to automate the process of owner identification of vehicles through Optical Character Recognition using a K-Nearest Neighbors algorithm. The implementation of the project was carried out in an incremental agile methodology to ensure the timely and efficient delivery of each module.

During the project, the team faced challenges related to the availability of high-quality data. However, with proper planning, analysis, and design, challenges were overcome, and the project was successfully completed. The project team had the necessary expertise in image processing, software development, and project management to ensure the success of the project.

The project successfully achieved its objectives of automating the owner identification process of embossed number plate vehicles. The system was able to accurately identify and match the owner's details with the vehicle's registration number. The project's implementation has the potential to reduce human errors and increase efficiency in the process of identifying vehicle owners. Overall, the project's success is attributed to the proper planning, analysis, design, and implementation using modern technologies and development methodologies.

10. APPENDIX

10.1 Creating a Project File

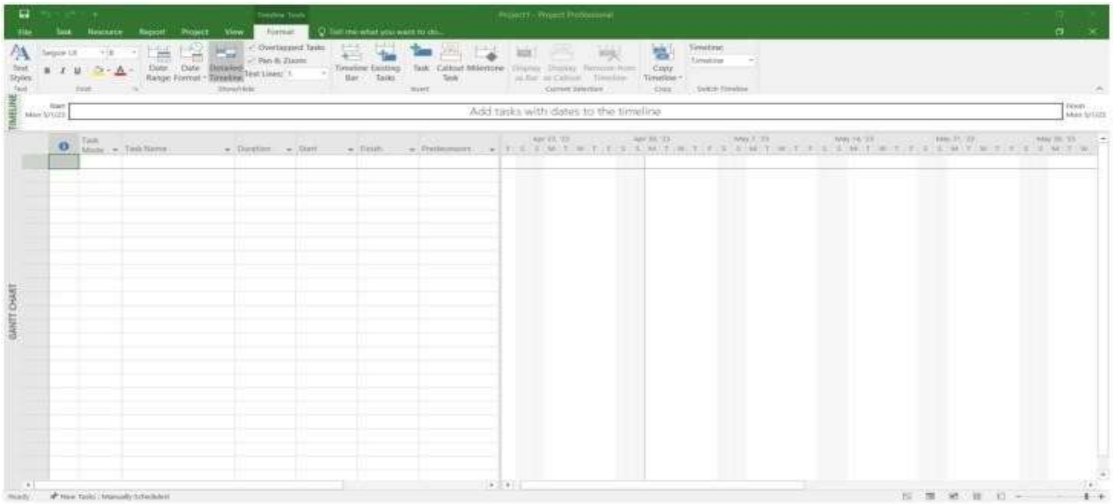


Figure 10: Creating a project file

10.2 Creating an Excel File

To create a excel, we first install and open the Ms. Excel then we land on the start page:

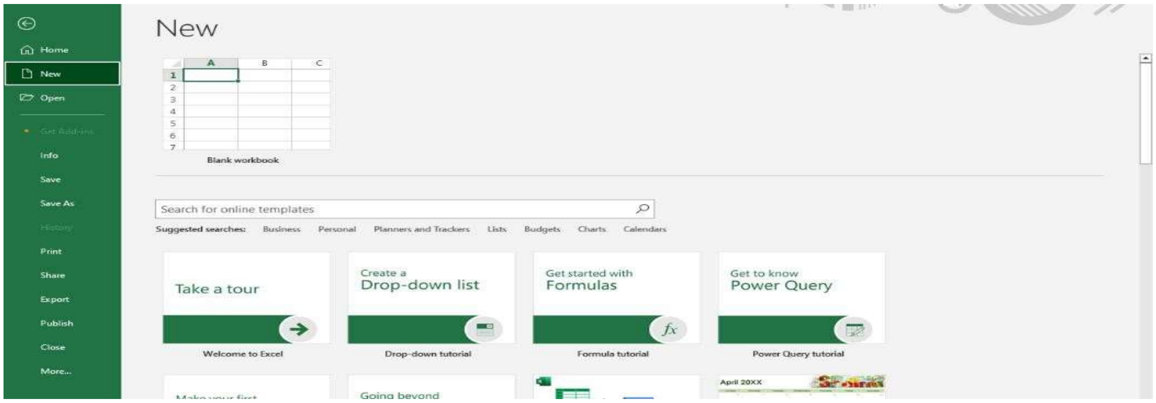


Figure 11: Creating an Excel File

From this page, we can create and start an Excel as per our preference among the following options:

- Start a new blank workbook.
- Start a new workbook from existing file.
- Start a new file using templates

- Continue on the recent or other files.

If we start a new *blank workbook*, we get to the following screen:

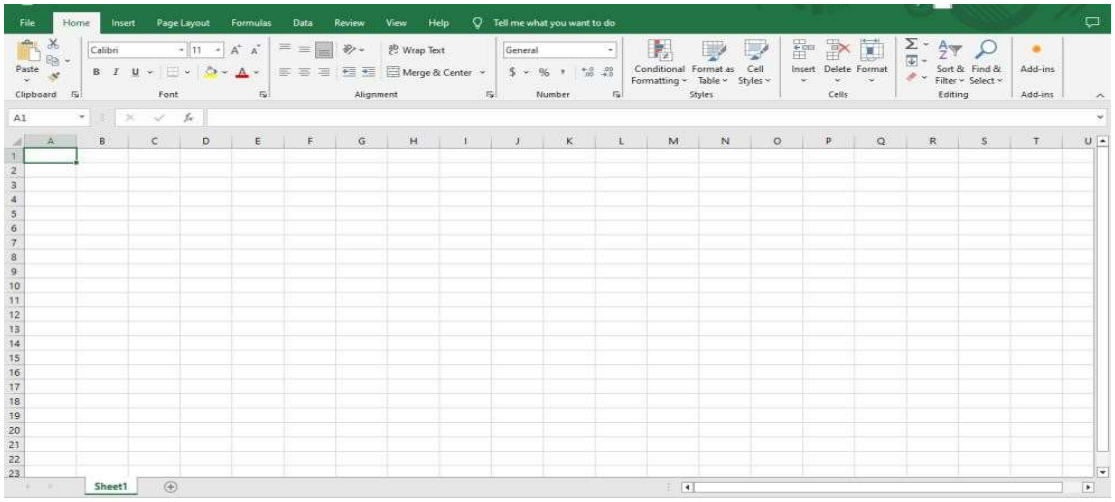


Figure 12: New Blank Workbook

After we create an excel file, we see multiple interfaces in menu bar namely, Home, Insert, Page layout, Formula, Data, Review, View

10.2.2 Formula

Excel comes with lots of formulas including financial, logical, text, date & time, lookup & reference, and math & trigonometry

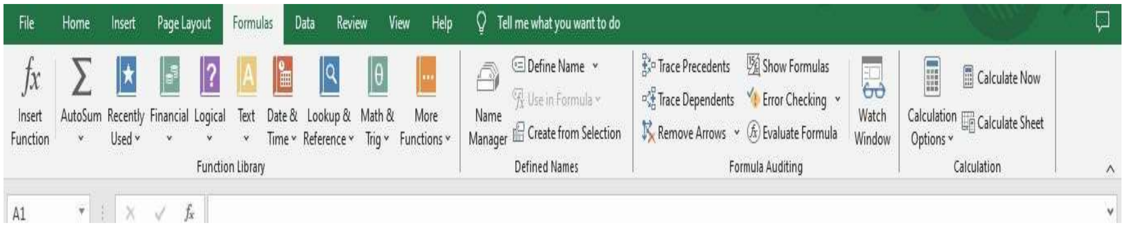
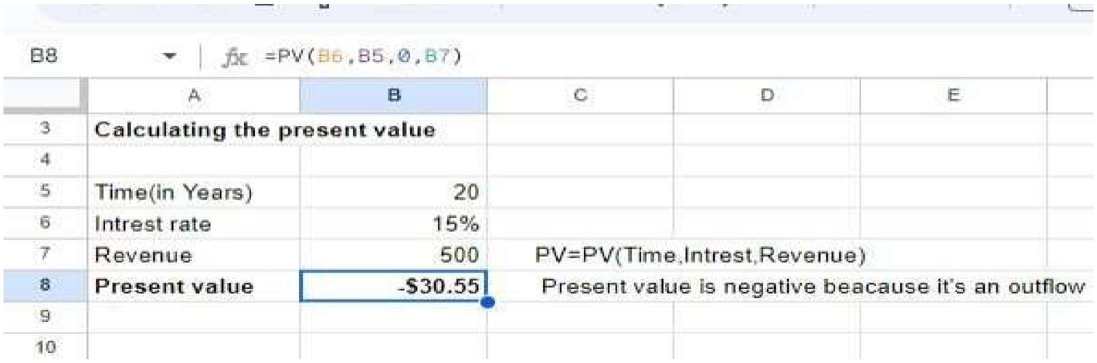


Figure 13 Formula Field in Excel

10.3 Illustration with Microsoft Excel for Present Worth

Suppose our project has been launched and introduced for the use. The initial outlay is $2000 and annual revenue respectively for 20 years is $500 assuming 15% interest rate then the present worth is calculated as follows:



B8 ▾ | fx =PV(B6,B5,0,B7)

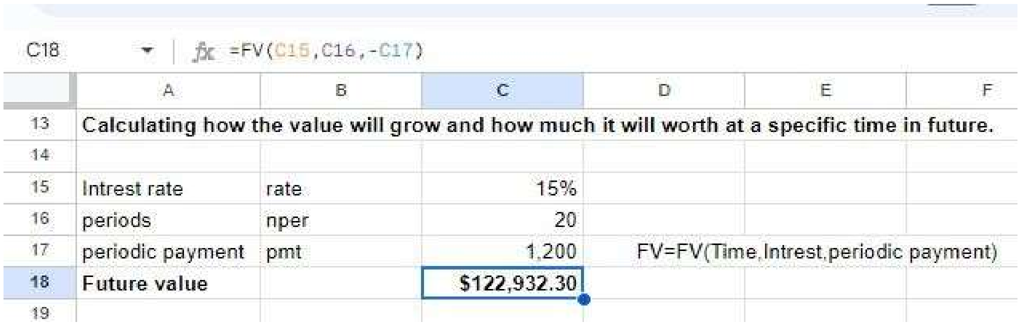
	A	B	C	D	E
3	**Calculating the present value**				
4					
5	Time(in Years)	20			
6	Intrest rate	15%			
7	Revenue	500	PV=PV(Time,Intrest,Revenue)		
8	**Present value**	-$30.55	Present value is negative beacause it's an outflow		
9					
10					

Figure 14: Present Worth

After calculating present worth providing rate, no. of period and the annual revenue, we got the present value as $30.55

10.4 Illustration with Microsoft Excel for Future Worth

Suppose our project has been launched and introduced for the use. The initial outlay is $2500 and periodic payment respectively for 20 years is $1200 assuming 15% interest rate then the present worth is calculated as follows:



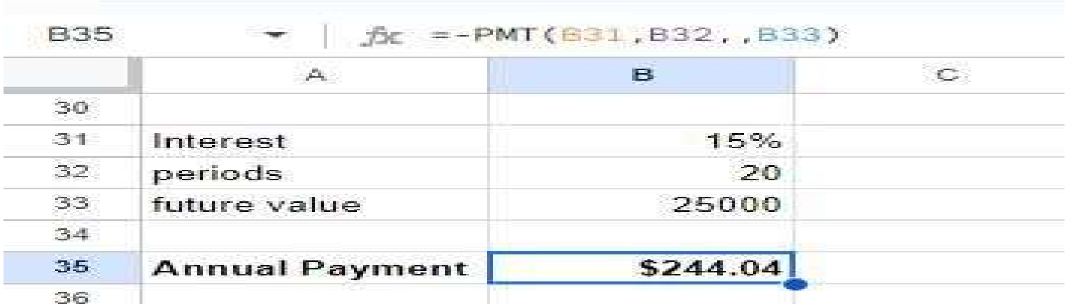
C18 ▾ | fx =FV(C15,C16,-C17)

	A	B	C	D	E	F
13	**Calculating how the value will grow and how much it will worth at a specific time in future.**					
14						
15	Intrest rate	rate	15%			
16	periods	nper	20			
17	periodic payment	pmt	1,200	FV=FV(Time,Intrest,periodic payment)		
18	Future value		$122,932.30			
19						

Figure 15: Future Worth when payment is given

10.5 Illustration with Microsoft Excel for Annual Worth

Suppose our project has been launched and introduced for the use. The initial outlay is $2500 and future value respectively for 20 years is $25,000 assuming 15% interest rate then the present worth is calculated as follows:



B35 fx =-PMT(B31,B32,,B33)

	A	B	C
30			
31	Interest	15%	
32	periods	20	
33	future value	25000	
34			
35	Annual Payment	$244.04	
36			

Figure 16: Annual Worth

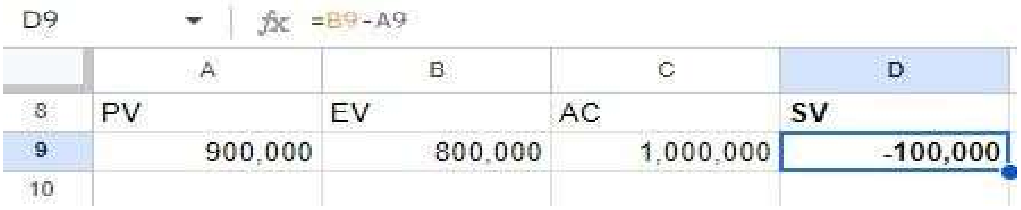
10.6 Illustration with Microsoft Excel for Earned Value Analysis

Example let's consider the following example: Assume that our project has a total budget of Rs. 14,00,000 and is expected to be completed in 80 days. At the 55th day, the project manager collects the following data:

Planned Value (PV) or BCWS: Rs. 9,00,000 Earned Value (EV) or BCWP: Rs. 8,00,000 Actual Cost (AC) or ACWP: Rs. 10,00,000

Using the EVA formulas mentioned earlier, we calculate the following EVA metrics:

SV = EV - PV = 800000 - 900000 = -100,000. This means that the project is behind schedule by 100,000 at the end of the 55th day.

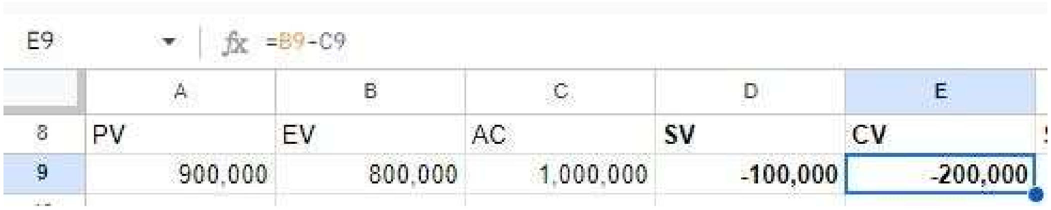


D9 fx =B9-A9

	A	B	C	D
8	PV	EV	AC	SV
9	900,000	800,000	1,000,000	-100,000
10				

Figure 17: Calculation of SV

CV = EV - AC = 800000 - 1000000 = -2,00,000. This means that the project is over budget by 2,00,000 at the end of the 55th day.

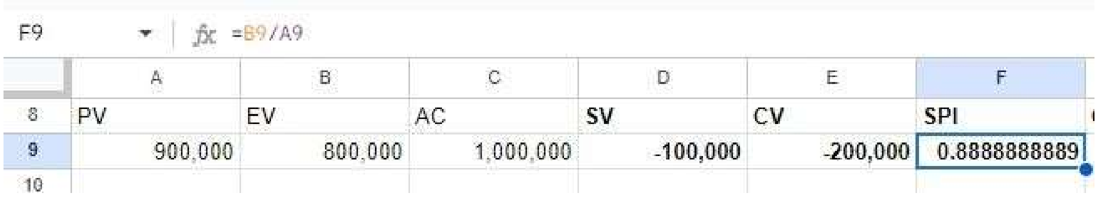


E9 fx =B9-C9

	A	B	C	D	E
8	PV	EV	AC	SV	CV
9	900,000	800,000	1,000,000	-100,000	-200,000

Figure 18: Calculation of CV

SPI = EV / PV =800000/900000 = 0.88889. This means that the project is completing work at a rate of 0.8889 of what was planned.

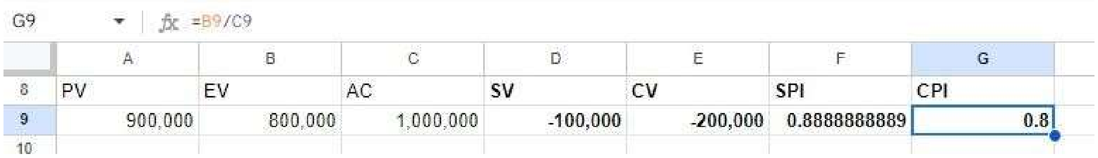


F9 fx =B9/A9

	A	B	C	D	E	F
8	PV	EV	AC	SV	CV	SPI
9	900,000	800,000	1,000,000	-100,000	-200,000	0.8888888889
10						

Figure 19: Calculation of SPI

CPI = EV / AC = 800000 /1000000 = 0.8. This means that the project is spending Rs. 0.8 to earn Rs. 1 of the planned value.

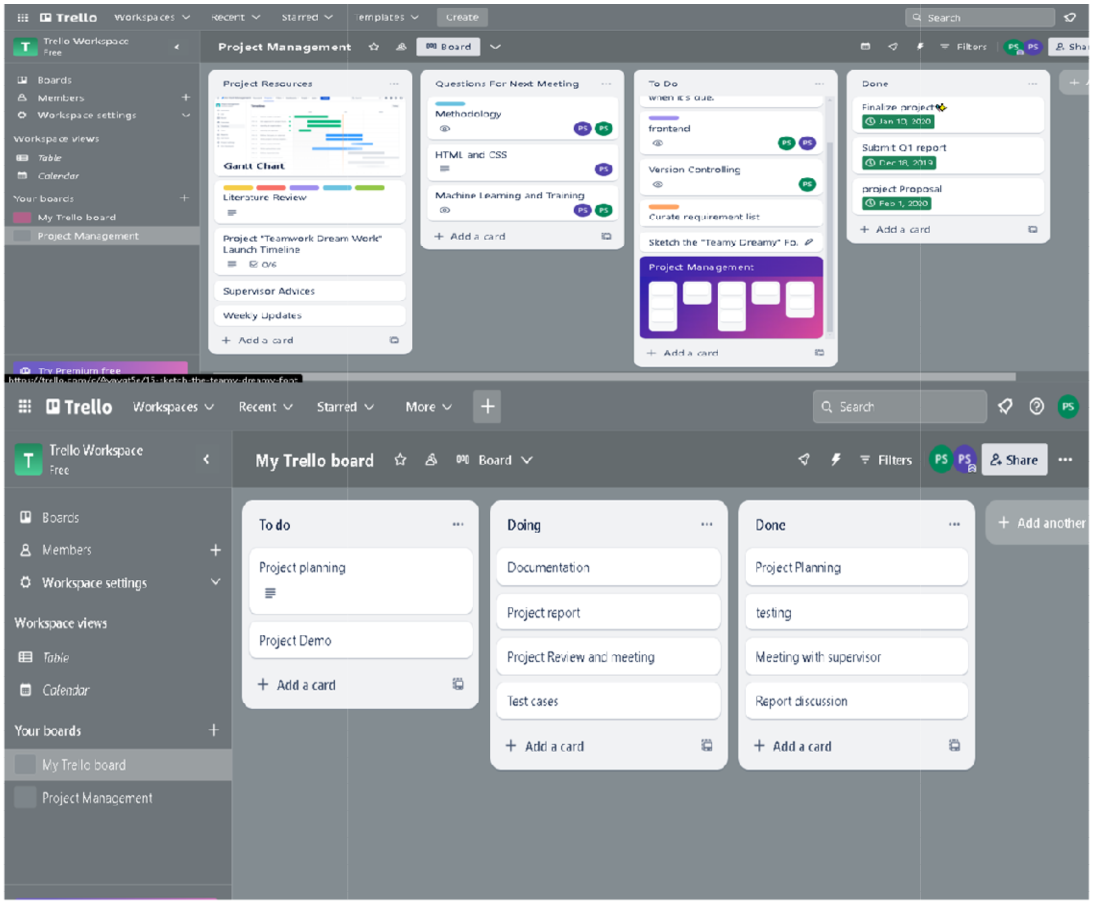


G9 fx =B9/C9

	A	B	C	D	E	F	G
8	PV	EV	AC	SV	CV	SPI	CPI
9	900,000	800,000	1,000,000	-100,000	-200,000	0.8888888889	0.8
10							

Figure 20: Calculation of CPI

10.7 Illustration of Resource Allocation



Project Management

Project Resources
- Gantt Chart
- Literature Review
- Project "Teamwork Dream Work" Launch Timeline 0/6
- Supervisor Advices
- Weekly Updates
- Add a card

Questions For Next Meeting
- Methodology
- HTML and CSS
- Machine Learning and Training
- Add a card

To Do
- when it's due.
- frontend
- Version Controlling
- Curate requirement list
- Sketch the "Teamy Dreamy" Fo.
- Project Management
- Add a card

Done
- Finalize project Jan 10, 2020
- Submit Q1 report Dec 18, 2019
- project Proposal Feb 1, 2020
- Add a card

My Trello board

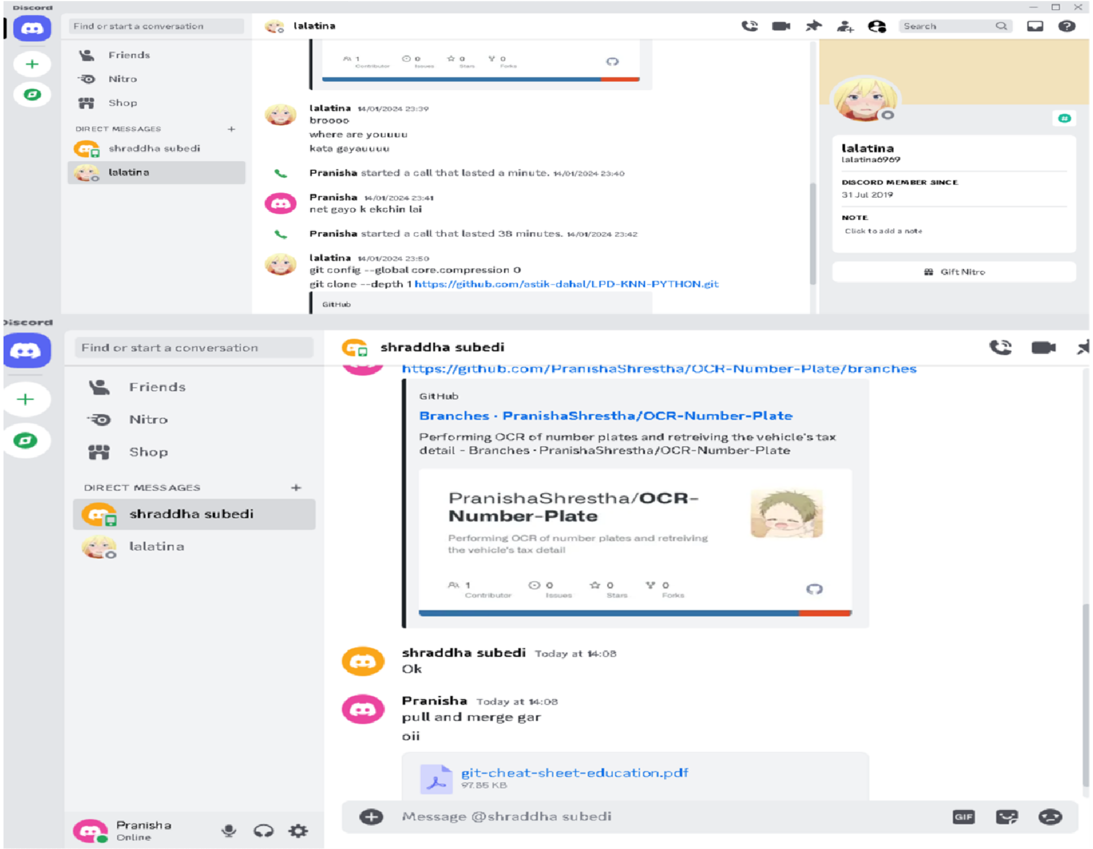
To do
- Project planning
- Project Demo
- Add a card

Doing
- Documentation
- Project report
- Project Review and meeting
- Test cases
- Add a card

Done
- Project Planning
- testing
- Meeting with supervisor
- Report discussion
- Add a card

Figure 21: Resource Allocation using Trello

10.8 Illustration Communication For Resource Allocation



lalatina 14/01/2024 23:39
broooo
where are youuuu
kata gayauuuu

Pranisha started a call that lasted a minute. 14/01/2024 23:40

Pranisha 14/01/2024 23:41
net gayo k ekchin lai

Pranisha started a call that lasted 38 minutes. 14/01/2024 23:42

lalatina 14/01/2024 23:50

```
git config --global core.compression 0
git clone --depth 1 https://github.com/astik-dahal/LPD-KNN-PYTHON.git
```

shraddha subedi

https://github.com/PranishaShrestha/OCR-Number-Plate/branches

GitHub
Branches · PranishaShrestha/OCR-Number-Plate
Performing OCR of number plates and retreiving the vehicle's tax detail - Branches · PranishaShrestha/OCR-Number-Plate

PranishaShrestha/OCR-Number-Plate
Performing OCR of number plates and retreiving the vehicle's tax detail

shraddha subedi Today at 14:08
Ok

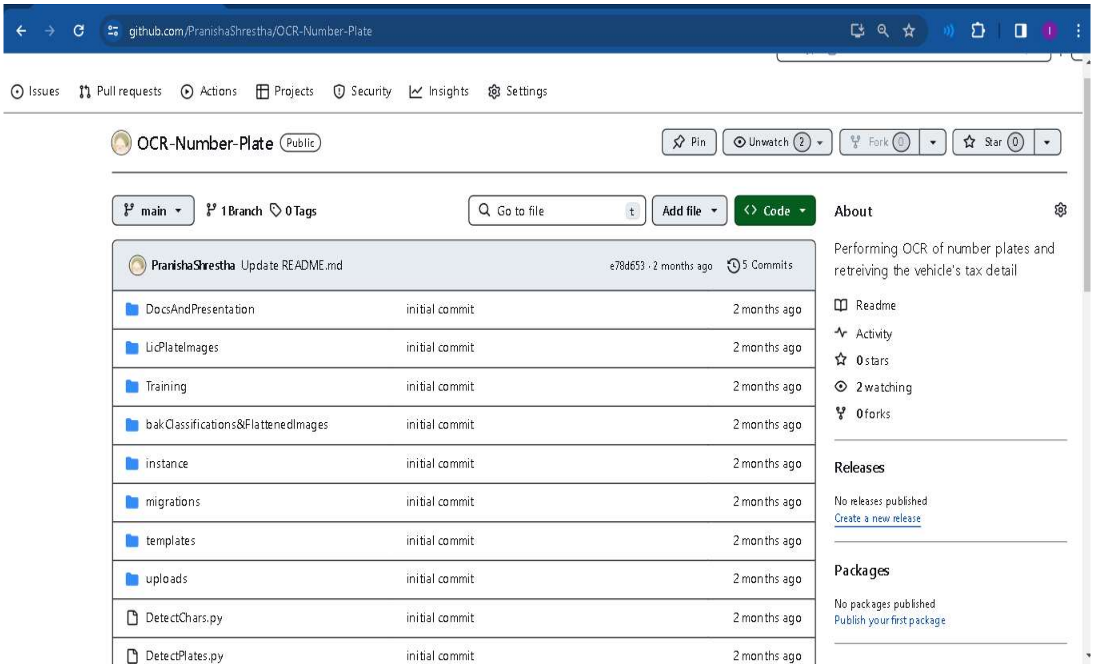
Pranisha Today at 14:08
pull and merge gar
oii

git-cheat-sheet-education.pdf
97.85 KB

Message @shraddha subedi

Figure 22: Resource Allocation Using Discord

10.9 Illustration of Version Control



PranishaShrestha Update README.md e78d653 · 2 months ago 5 Commits

DocsAndPresentation	initial commit	2 months ago
LicPlateImages	initial commit	2 months ago
Training	initial commit	2 months ago
bakClassifications&FlattenedImages	initial commit	2 months ago
instance	initial commit	2 months ago
migrations	initial commit	2 months ago
templates	initial commit	2 months ago
uploads	initial commit	2 months ago
DetectChars.py	initial commit	2 months ago
DetectPlates.py	initial commit	2 months ago

About

Performing OCR of number plates and retreiving the vehicle's tax detail

Releases

No releases published
Create a new release

Packages

No packages published
Publish your first package

Figure 23: Version Control Through github