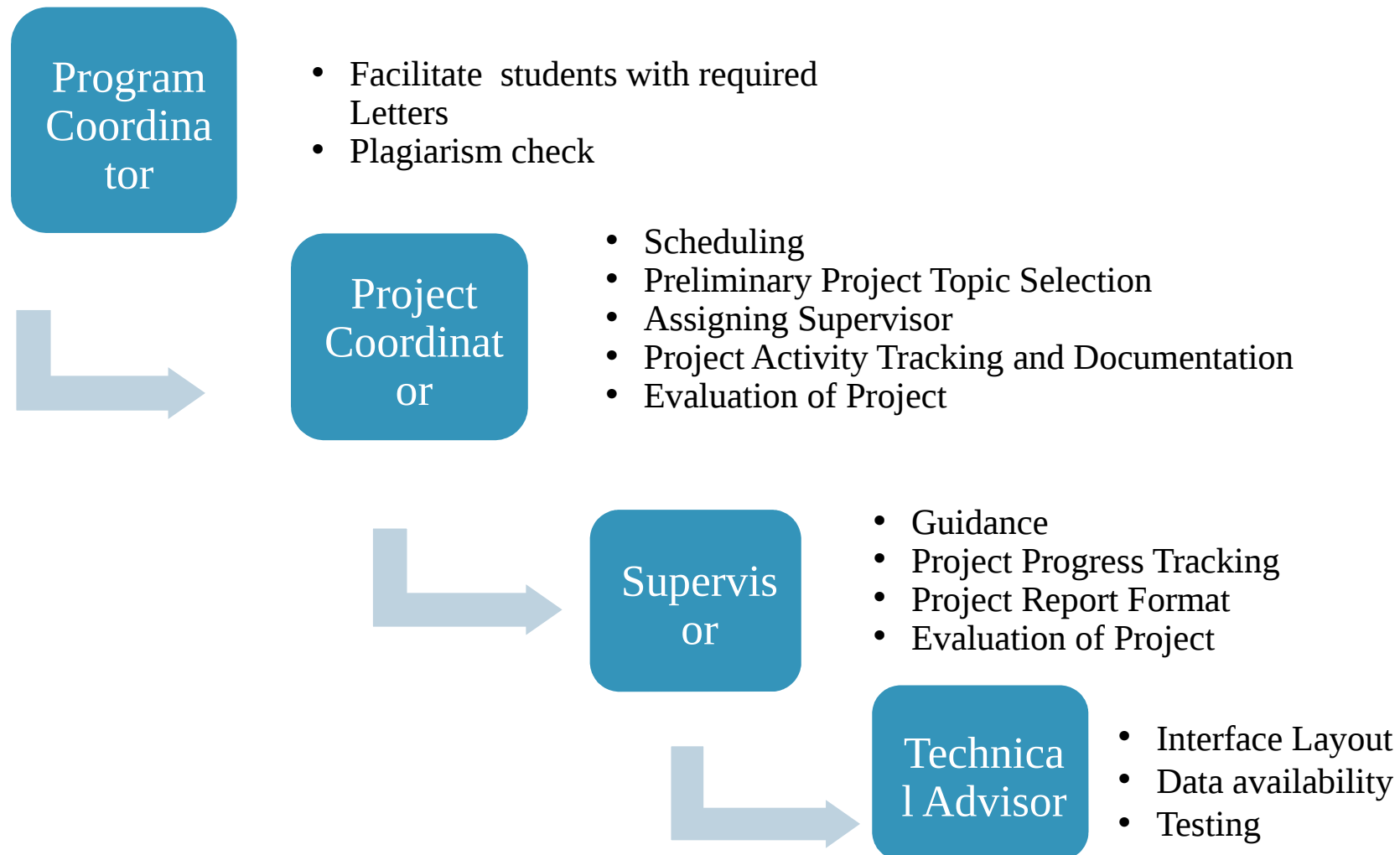


# Proposal Writeup

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CDCSIT, TU  
9 April, 2017

# WORKFLOW



# PROJECT DOMAIN



Executable Project



Project only with CRUD Operations



Demonstration of any algorithm

- Not necessarily hard core machine learning algorithms
- Can be simple algorithms to make smart systems



Project with API only

- Coding should be carried out for major modules with respect to the Algorithm chosen

# Proposal Format

Title

Overview/Introduction

Statement of Problem

Objective

Literature Review (can also consist related works)

Methodology

Expected Result (Interface design- If possible)

References

# Title

Do not use Nepali Words like

- Kira Fatyangra
- Kotha Bhetyo

If you use Nepali words, elaborate it

- Kotha Bhetyo : A web based application for searching
- rooms for rent

Title should not be very lengthy like

- A prediction system which predicts the final marks of students of abc by implementing machine learning algorithm like Neural Network

Title should be short but descriptive like

- Marks Prediction System using Neural Network

# Statement of Problem

Highlight on the major issues which needs to be addressed

One paragraph is sufficient as

Prediction of Marks has always been a challenging task for abc. They have been using softwares like abc, xyz; which are not accurate as the predicted value deviates by 45%.

This has proven to one of the major hindrance in formulating its academic plan.

# Objective

It should directly address the statement of problem  
Make it specific as possible and begin with word “To”

Do not include unnecessary objectives like

- To fulfill the course requirement of B.Sc. CSIT
- To learn Neural Network
- To learn Python

# Objective (continued)

The objective can be framed as

- To develop marks prediction system using Neural Network
- To decrease the deviation rate of the predictor than the exiting one.



# Literature Review

Find Recent Papers which consists of

- Title
- Writer / writers
- Published at Journals/ Conference
- Published Date

Don't include following

- blog materials
- Wikipedia
- Videos

# Why Literature Review

To frame your methodology

To justify your methodology

You should be able to answer

- Why did you chose certain techniques for data analysis out of many ?

- Why did you chose the particular algorithm out of many ?

- Why did you chose the particular validation technique out of many?

# How to Review Literature

Read Abstract and conclusion

- If it is related to your objective then start exploring its methodology
- Choose the best methodology out of the reviewed literatures which can be sorted out from its findings

# Things to be included in Methodology

Data Collection and selection of parameters

- From Where and how ? ( it can be secondary as well)

Major Algorithms to be used

- Why did you chose it have to answered?

Review/ Validation Techniques

- Why did you chose it have to answered?

Note: Every answer should be justified with reference to the papers you have reviewed.

# Methodology

## Data Collection

- Data Will be collected from xyz (Source)
- The repository includes details of students from 2012

## Selection of Parameters

- Mid Term Marks
- Pre-board Marks
- Assignment percentage
- Attendance

(The above parameters have been proven successful in [5])

# Methodology (Continued)

## Prediction Algorithm

- Back Propagation Algorithm will be used to model the prediction system.
- (The Algorithm had an efficiency of 85 % in [3])
- List the algorithm

# Methodology (Continued)

## Validation Technique

- Precision and Recall will be used to validate the prediction mode  
(The technique proved to be beneficial in [4],[6])
- List the necessary Formulas

# References

References should be written in IEEE / APA format

- 1.
- 2.
- 3.
- 4.
- 5.



# Restaurant Recommendation System Based on Collaborative Filtering

# Overview/Introduction

- A web based application that recommends restaurant and food to the users on the basis of their preferences.
- Preferences is based on:
  - Rating of other users who have similar preference as of the user.
  - The type of restaurant the user has visited in past and their rating to different food.

# Problem Statement

- The conventional way of giving and getting recommendation has severe limitations in terms of accuracy.
- Limited Knowledge
- Unreliable
- Not always accurate and precise

# Objective

- To collect user ratings on the food items of different restaurants in Kathmandu Valley.
- To recommend restaurants and foods to users based on their user ratings using collaborative filtering algorithm

# Literature Review

- The history of the web so far says that we are highly motivated to come up with ways to make sense of a world richer and more interesting than the constrained resources of the traditional media let on. – (Andrew Keen,date)
- There are tremendous amounts of information on the internet which often becomes overwhelming for the user, and can be difficult for them to find the exact information they are searching for. (Larry Page, date)

# Related Works

- Amazon.com
- Netflix
- TripAdvisor.com
- Moviefinder.com
- We Predict
- YellowPages

# Methodology

- Data Collection
  - The list of restaurants and their food menu were collected using web scraping.
  - Ratings were created on the basis of response collected from the survey.

# Algorithm Used

- User-based Collaborative Filtering
- Item- based Collaborative Filtering



# User Based Collaborative Filtering

- Recommend items to the user based on the rating of other users having similar preferences.
- Works perfectly fine when the number of users and items are less.
- But, when the number of items starts increasing problems of data sparsity occurs.

# User Based Collaborative Filtering

- Recommend items to the user based on the rating of other users having similar preferences.
- Works perfectly fine when the number of users and items are less.
- But, when the number of items starts increasing problems of data sparsity occurs.

# Item-Based Collaborative Filtering

- Used to recommend items to the users based on their previous ratings.
- Similar to user-based collaborative filtering, except that the similarity between items is calculated instead of similarity between users.
- Eliminates the problem of sparsity, but there exist cold start problem at first.

# Item- Based Collaborative Filtering

- List all the items with the given to them by different users.
- Calculate similarity between the items using Pearson Correlation Coefficient.
- Sort the similarity between the items such that the items in descending order.
- Produce weighted scores that rank the items by multiplying the ratings by different users similarity score.

# Validating the Model

- Precision and Recall Model was used to validate the model.

# Dota 2 line up prediction system

# Problem Statement

- Dota 2 games are dependent on hero picks. The hero pick has a big role in determining outcome of the game.
- The availability of automatic systems that recommend heroes is low.

# OBJECTIVE

- To build a Recommendation system using KNN ( K-Nearest neighbors) algorithm for DOTA 2.



# Literature Review

- Dota2, due to its popularity and consistent growth, has drawn fair amount of attention in machine learning projects.
- In 2014, [2] Atish and Michael did a project on DotA 2 team composition. They predicted winning side by looking at how both sides pick their heroes including interactions between heroes.
- However, they found out that after incorporating hero interaction, the accuracy is lower than the

# Literature Review

Conclusion:

K nearest neighbour algorithm gives more efficiency rather than using logistic regression.

# Methodology



# Feature Selection

- Since there are 110 playable heroes, we assume every player can play all the heroes.
- This simplifies the problem and we can only consider hero selection in the game.

# Feature Selection

- Using such assumption, the feature vector will be,

$$\phi(X) = \begin{pmatrix} X_1 \\ X_2 \\ \vdots \\ X_{112} \\ X_{113} \\ X_{114} \\ \vdots \\ X_{224} \end{pmatrix}$$

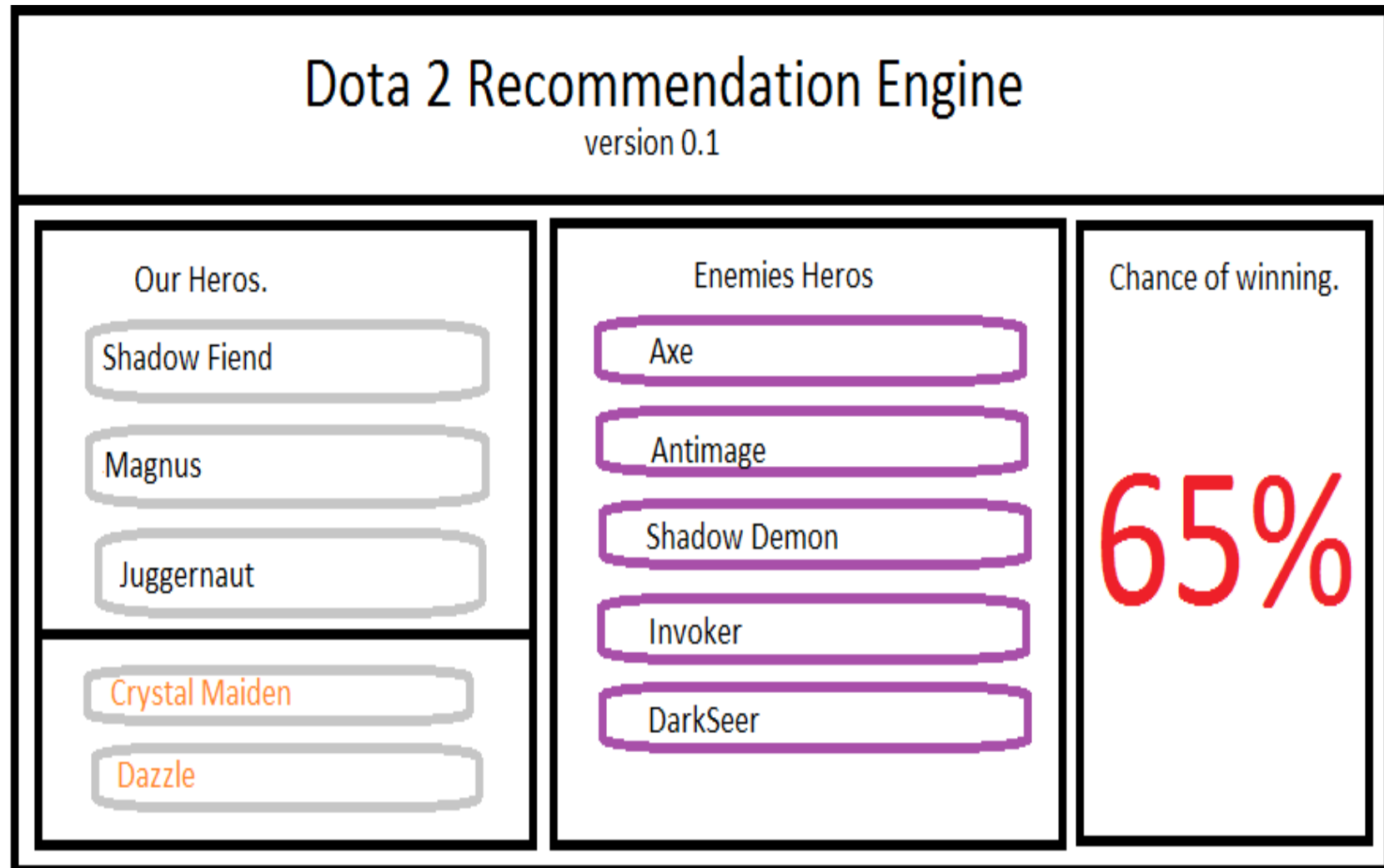
# Feature Selection

- Since there are 110 playable heroes, we assume every player can play all the heroes.
- This simplifies the problem and we can only consider hero selection in the game.

# K nearest neighbor algorithm

- K-nearest neighbors is a non-parametric method for classification and regression that predicts objects' class memberships based on the k-closest training examples in the feature space.
- K-nearest neighbors helps better model the relationships between heroes instead of simply taking into account wins when a hero is present.

# Recommendation System Engine draft:





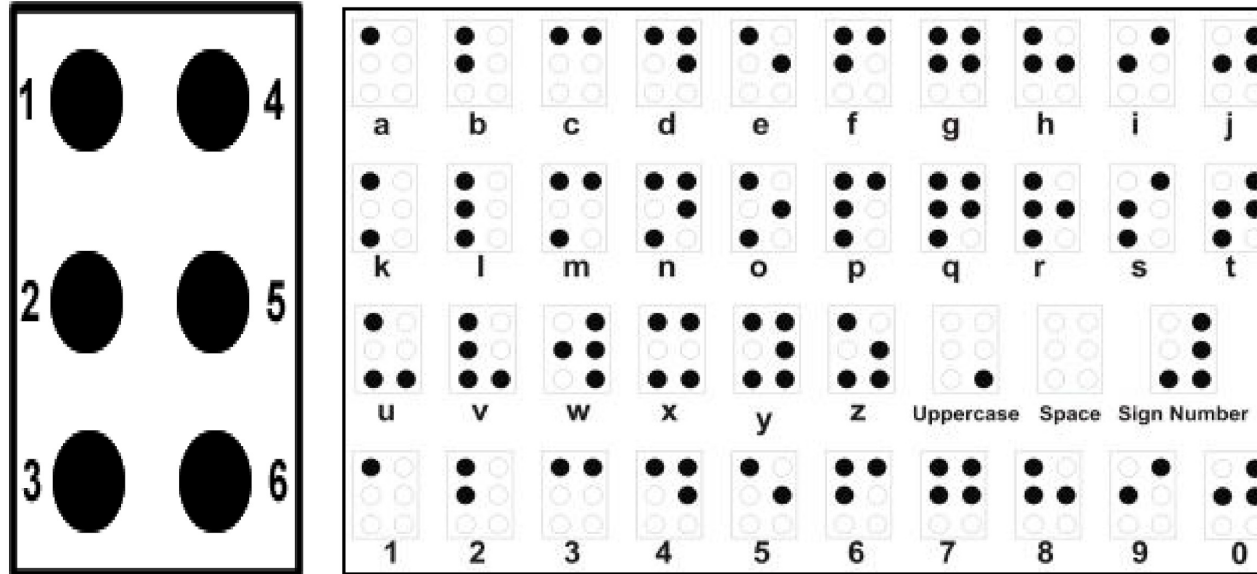
# References

- [1] K. Conley and D. Perry, “*How does he saw me? a recommendation engine for picking heroes in Dota2,*” CS229 Previous Projects, 2013.
- [2] A. Agrawal and M. Pierce “*Learning Dota2 team compositions*”, 2014.
- [3] K. Song, T. Zhang and C. Ma “*Predicting the winning side of Dota2*”, CS229 Previous Projects, 2015.
- [4] DotaBuff, “*Highest win rate, this month,*” Dec. 2016.

# Braille Letter Recognition using Back Propagation Algorithm

# Overview

- Braille letters is characters designed for the blind, composed of six embossed points, arranged in a standard braille character



# Statement of Problem

- Braille letters are difficult to recognize as sensitivity of the pinned letters on the fingers as well as memorization of those pinned structure plays a huge factor in its recognition.

# Objectives

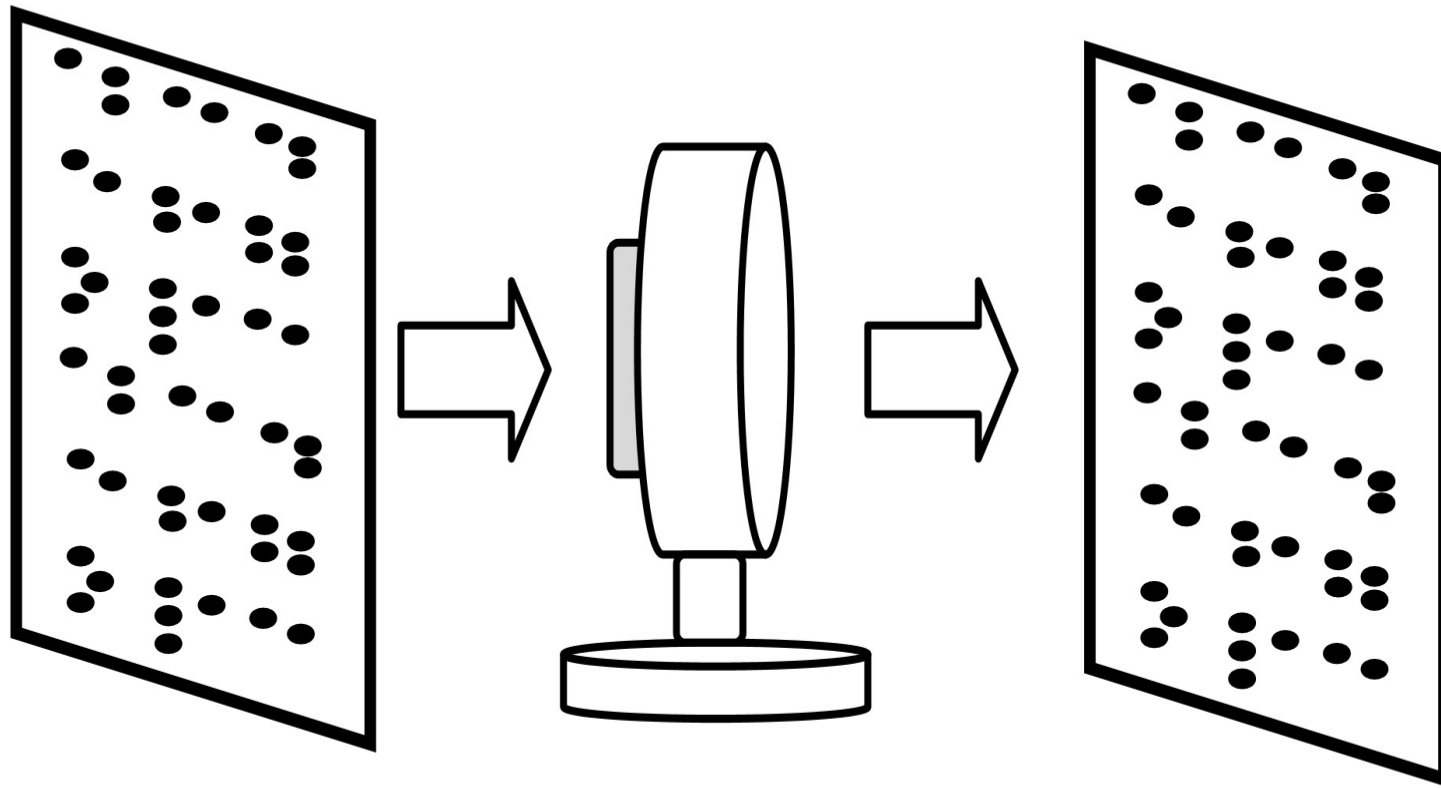
- To recognize braille letter characters and represent them as their corresponding natural language characters using back propagation algorithm.

# Literature Review

- A mobile Braille recognition system is proposed by running a Java programmed application installed in a camera-phone. The aim of the research is to provide a portable and helpful tool to improve the independence of the visually impaired users. (Shanjun & Kazuyoshi, 2007). [1]
- The last stage of matching algorithm is the Braille recognition which shows the process of converting the Braille data to the chosen Chinese Language text. (Jia et al., 2010) [2]

# Methodology

- Capturing Braille image
- Image Processing
  - Image cropping, Gray Scaling, Thresholding, Morphological operation
- Artificial Neural Network
  - Find Center Coordinates Each Dot, Segmentation Braille Each Character , Back Propagation

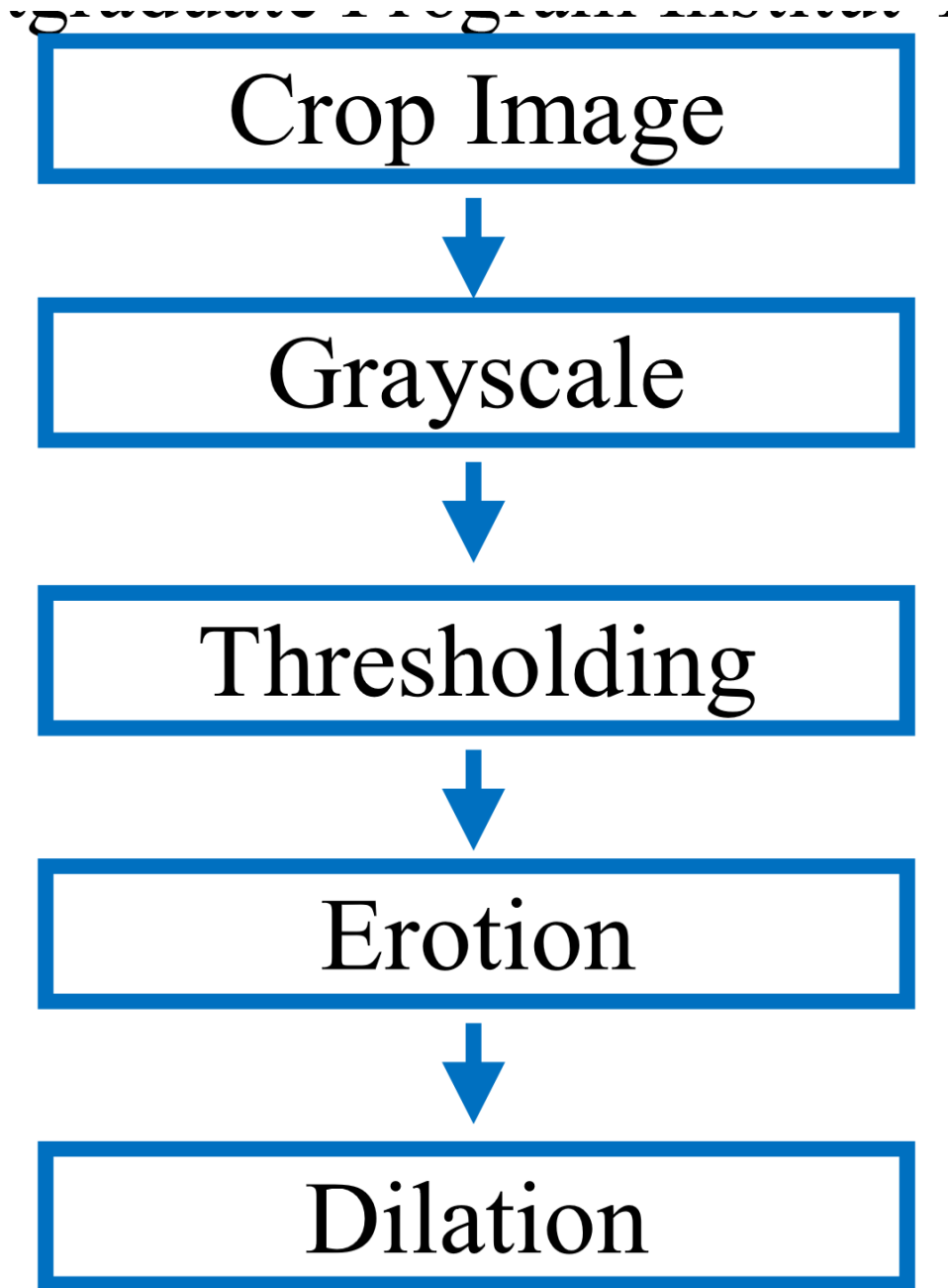


Braille Paper

Webcam

Braille Image



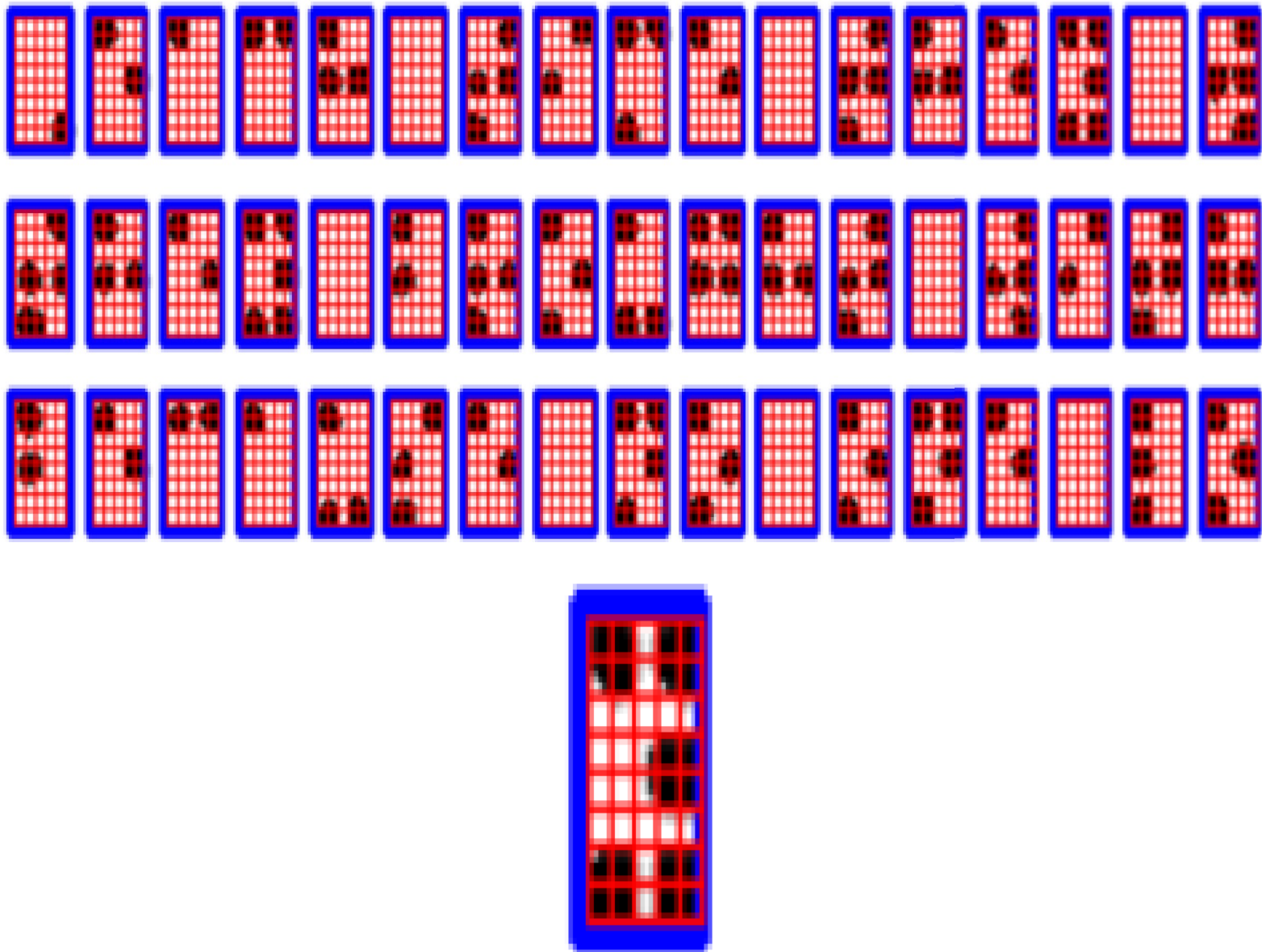


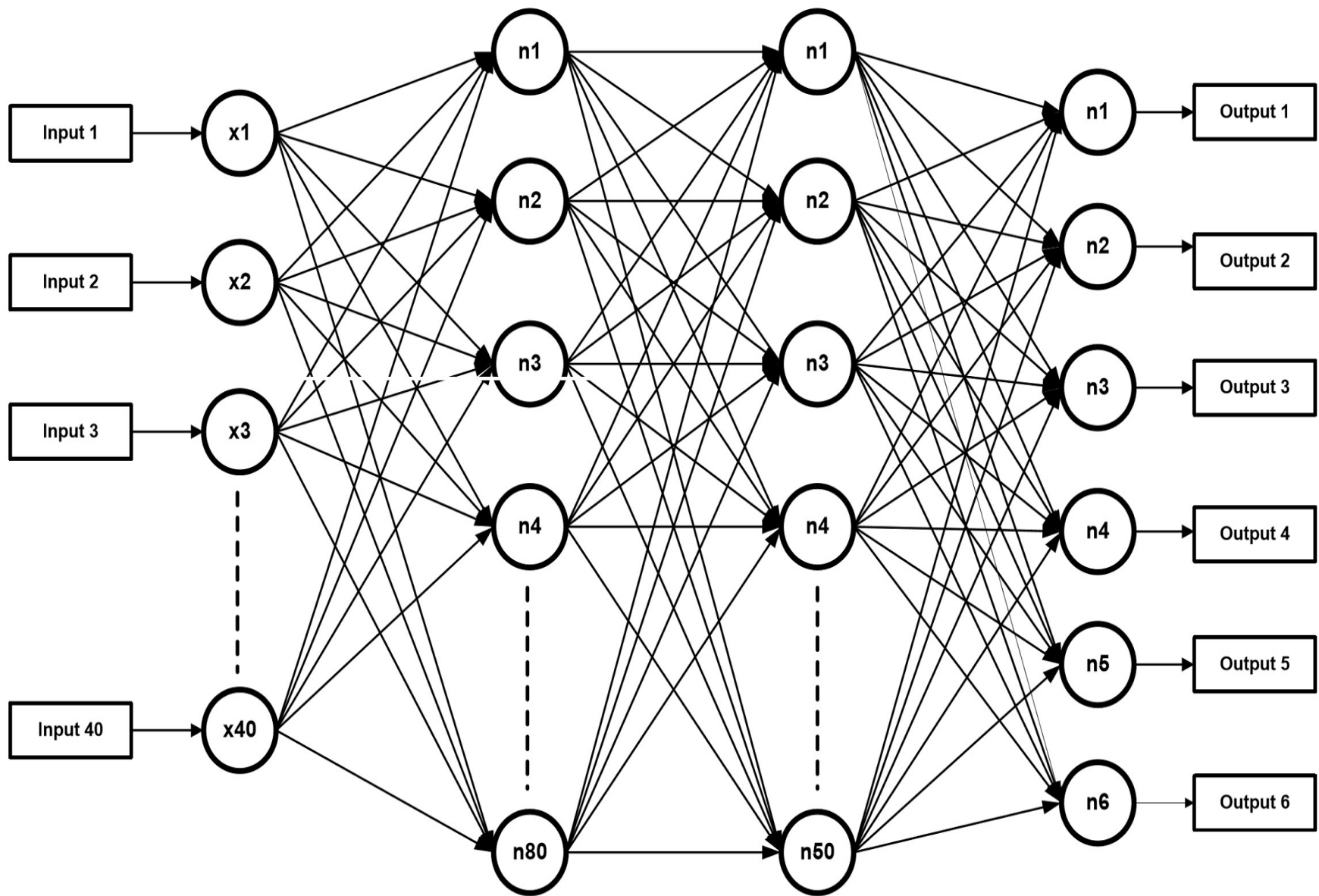
Find coordinat (x,y)  
using find contour

```
graph TD; A[Find coordinat (x,y)  
using find contour] --> B[Segmentation area  
braille character]; B --> C[Artificial Neural  
Network];
```

Segmentation area  
braille character

Artificial Neural  
Network





# Expected results



# References

- [1] Shanjun, Z & Kaiuyoshi, Y. (2007). A Braille Recognition System by the Mobile Phone with Embedded Camera. IEEE, Computer Society Washington, Page 223
- [2] Jia, Y., Lirong, W. & Jie, L. (2010). The Research on Paper-mediated Braille Automatic Recognition Method. IEEE, Frontier of Computer Science and Technology (FCST). pp 61 9-621.
- [3] Al-Shamma, S. D. & Sarni, F. (2010). Arabic Braille Recognition and Transcription into Text and Voice. Cairo International Biomedical Engineering Conference Cairo, Egypt. pp.227-23 1.
- [4] Rawan, I. Z. & Tomnader, J. B. (201 1). Braille Recognition System - With a Case Study Arabic Braille Documents. European Journal of Scientific Research, V01.62. pp. 116-122

# Maze Solving With Dead End Pruning Using Image Processing Followed By A\*

# Agenda

- Overview
- Problem Statement
- Objective
- Literature Review
- Methodology
- References



# Acronyms

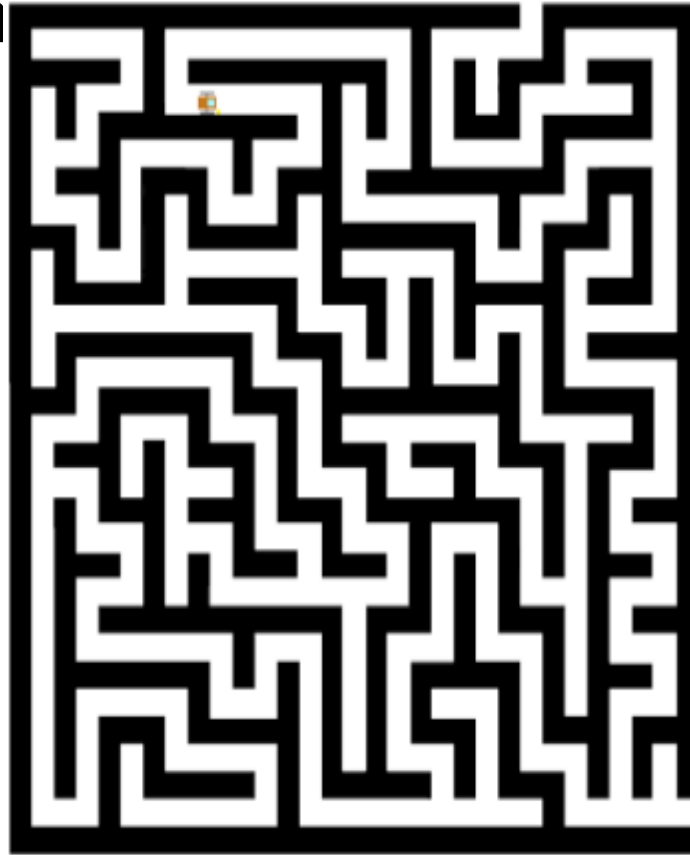
- NGT – Non Graph Theory
- GT – Graph Theory
- BFS – Breadth First Search
- DFS – Depth First Search
- IDA\*- Iterative Deepening A\* Search

# Overview

- At the base, the project is related to **path-finding**
  - **Path-finding** : employed as core of AI movement system [1]

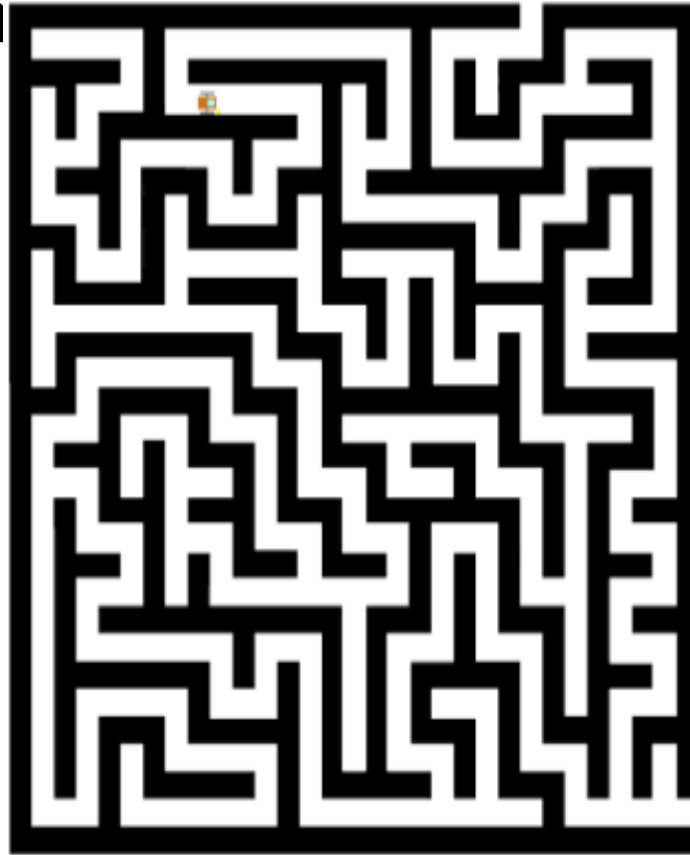
# Problem Statement

- The Maze Problem



# Problem Statement

- The Maze Problem



# Objective

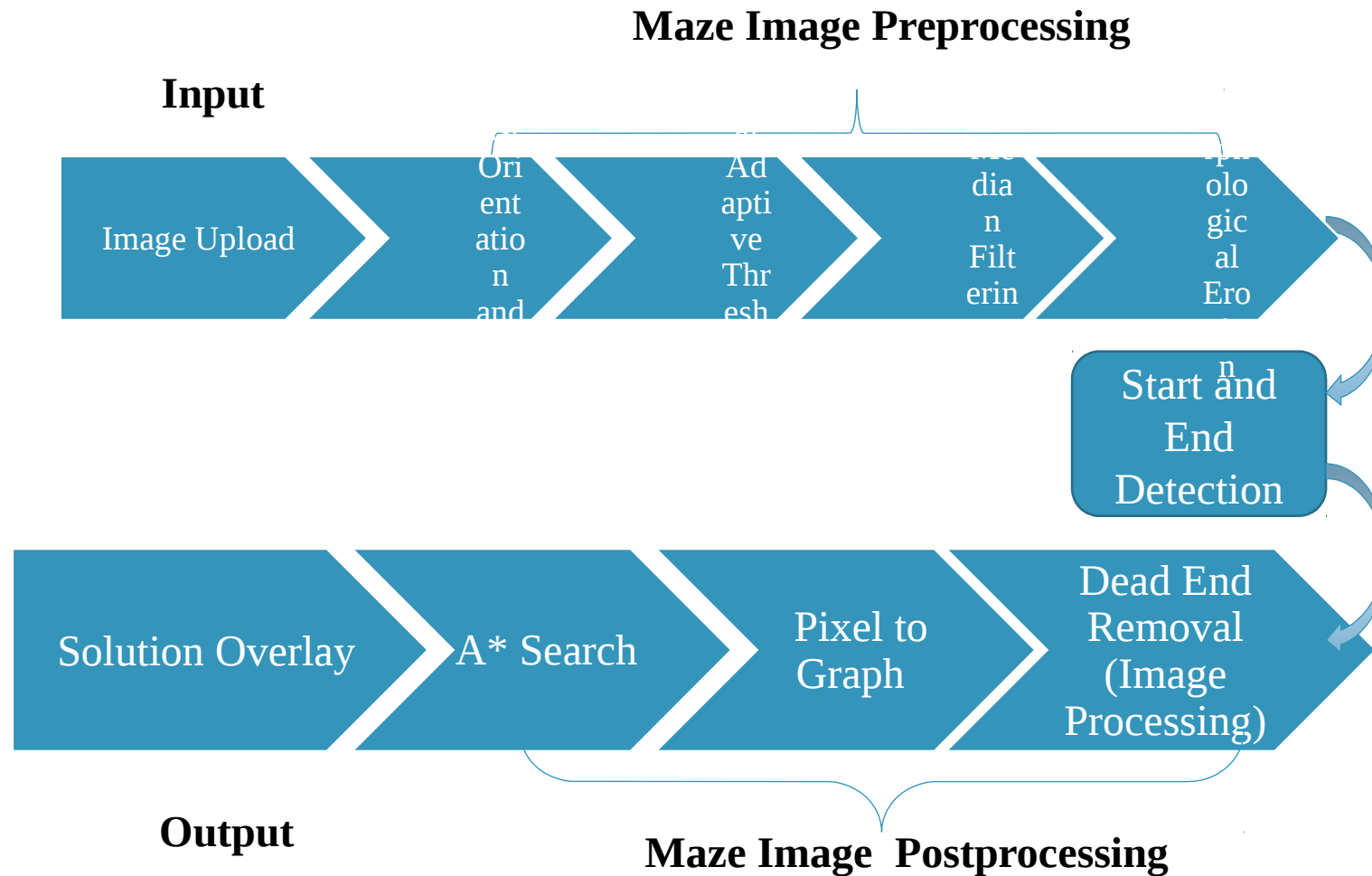
- To automate maze solving with computers using Mixed Module (dead end pruning using image processing followed by A\*)

# Literature Review

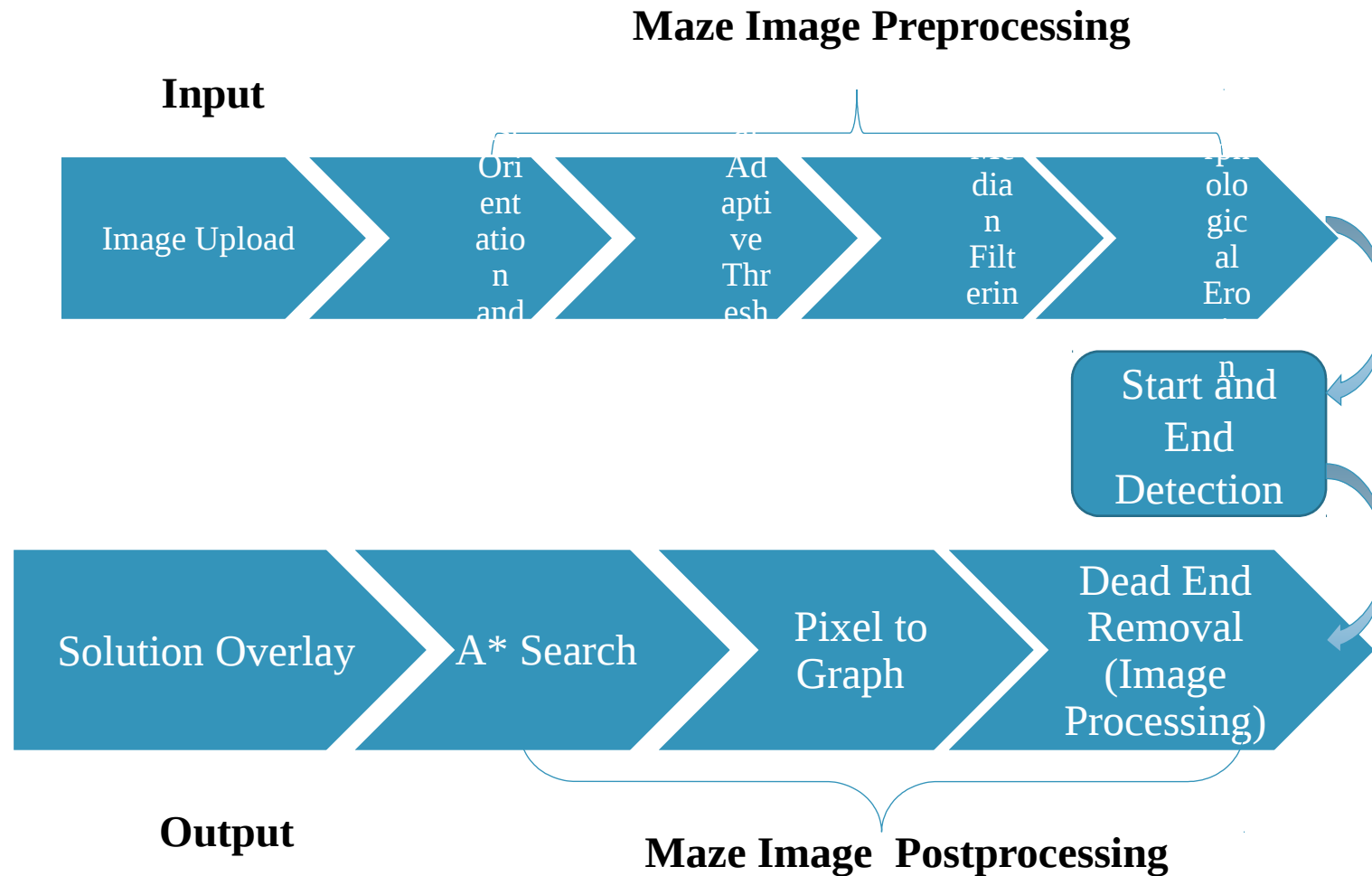
- Wide range of maze solving algorithms
- Can be classified as:
  - Traveler based (no idea of the entire maze structure at once)
    - *Example: The Random Mouse, Pledge, Tremaux*
  - Maze based (idea of the entire maze structure at once)
    - *GT algorithms like BFS, DFS, A\**
    - *NGT algorithms like dead end filling, image processing based approaches*

[2] [3]

# Methodology



# Methodology





# References

[1]N. Barnouti, S. Al-Dabbagh and M. Sahib Naser, "Pathfinding in Strategy Games and Maze Solving Using A\* Search Algorithm", *Journal of Computer and Communications*, vol. 04, no. 11, pp. 15-25, 2016.

[2]N. Yew, K. Tiong and S. Yong, "Recursive Path-finding in a Dynamic Maze with Modified Tremaux's Algorithm", *International Journal of Mathematical, Computational, Physical, Electrical and Computer Engineering*, vol. 5, no. 12, pp. 1-1, 2011.

[3]B. Gupta and S. Sehgal, "Survey on techniques used in Autonomous Maze Solving Robot", *2014 5th International Conference - Confluence The Next Generation Information Technology Summit (Confluence)*, 2014.

[4]K. Sharma and C. Munshi, "A Comprehensive and Comparative Study Of Maze-Solving Techniques by Implementing Graph Theory", *IOSR Journal of Computer Engineering (IOSR-JCE)*, vol. 17, no. 1, pp. 24-29, 2015.

[5]M. Tak and S. Datta, "A Comprehensive and Comparative Study of Maze-Solving Techniques by implementing Graph Theory- implementation of Djikstra's algorithm for solving a maze", *International Journal of Engineering Trends and*

Thank You