Proposal Writeup

Asst. Prof. Sarbin Sayami
CDCSIT, TU
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WORKFLOW

Program Coordinator
- Facilitate students with required Letters
- Plagiarism check

Project Coordinator
- Scheduling
- Preliminary Project Topic Selection
- Assigning Supervisor
- Project Activity Tracking and Documentation
- Evaluation of Project

Supervisor
- Guidance
- Project Progress Tracking
- Project Report Format
- Evaluation of Project

Technical Advisor
- Interface Layout
- Data availability
- Testing

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

Retrieve Data

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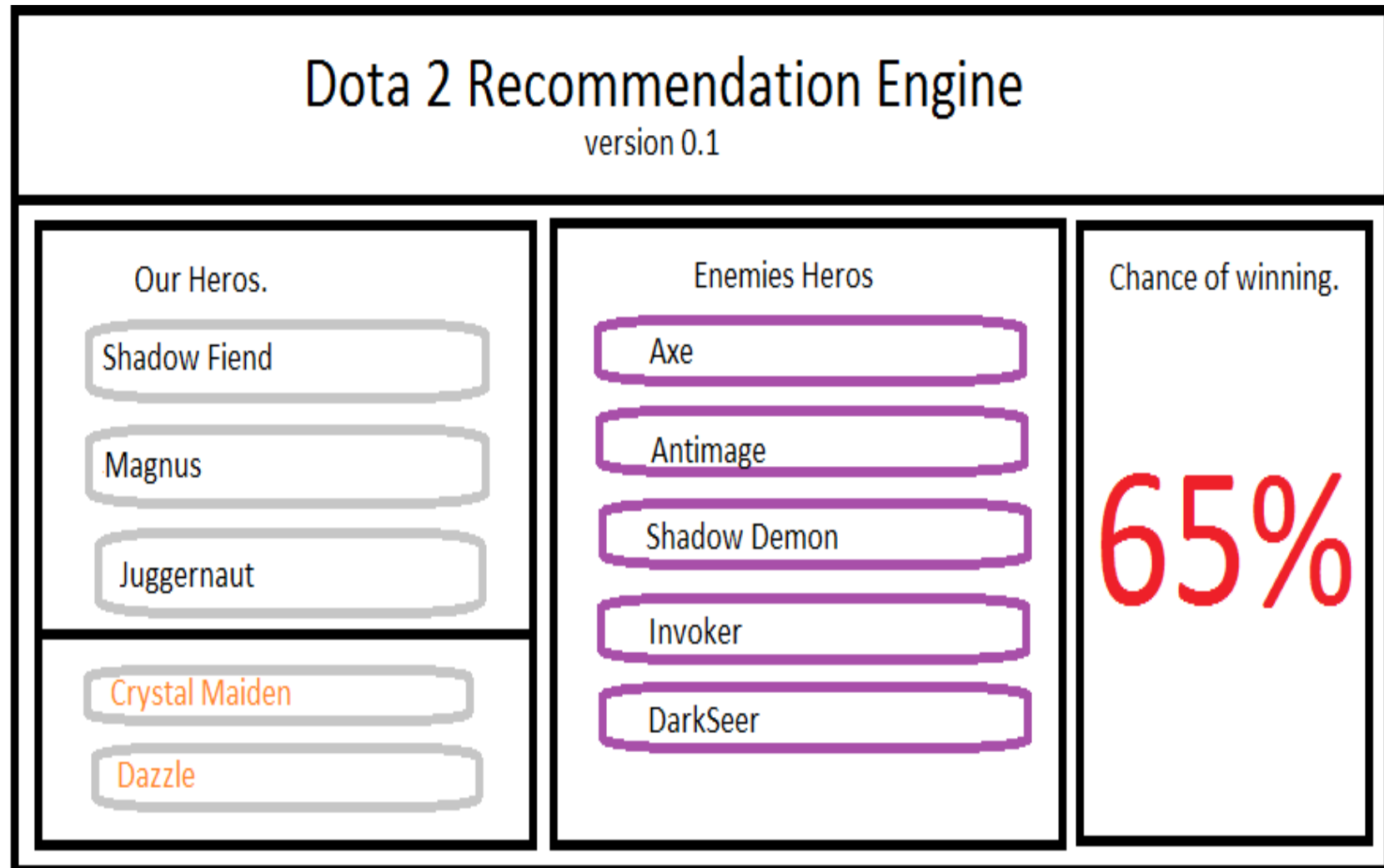Alg

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Arc

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:

Dota 2 Recommendation Engine
version 0.1

Our Heros.	Enemies Heros	Chance of winning.
Shadow Fiend	Axe	65%
Magnus	Antimage	
Juggernaut	Shadow Demon	
Crystal Maiden	Invoker	
Dazzle	DarkSeer	

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
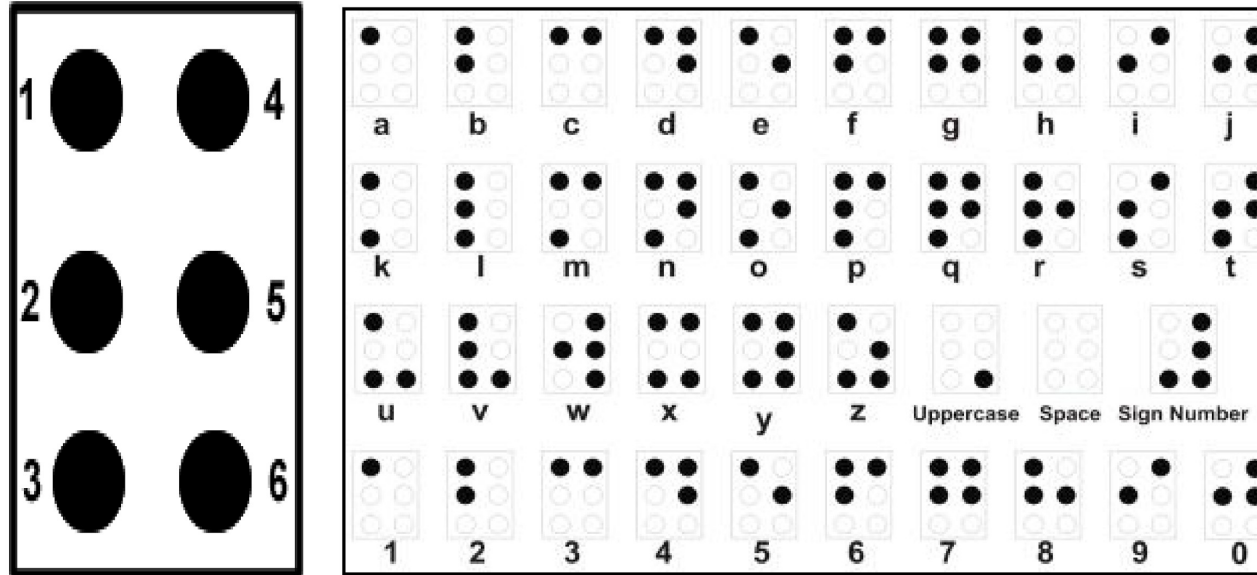
Statement of Problem

- 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 programed application installed in a camera-phone. The aim of the research is to provide a portable and helpfil 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]
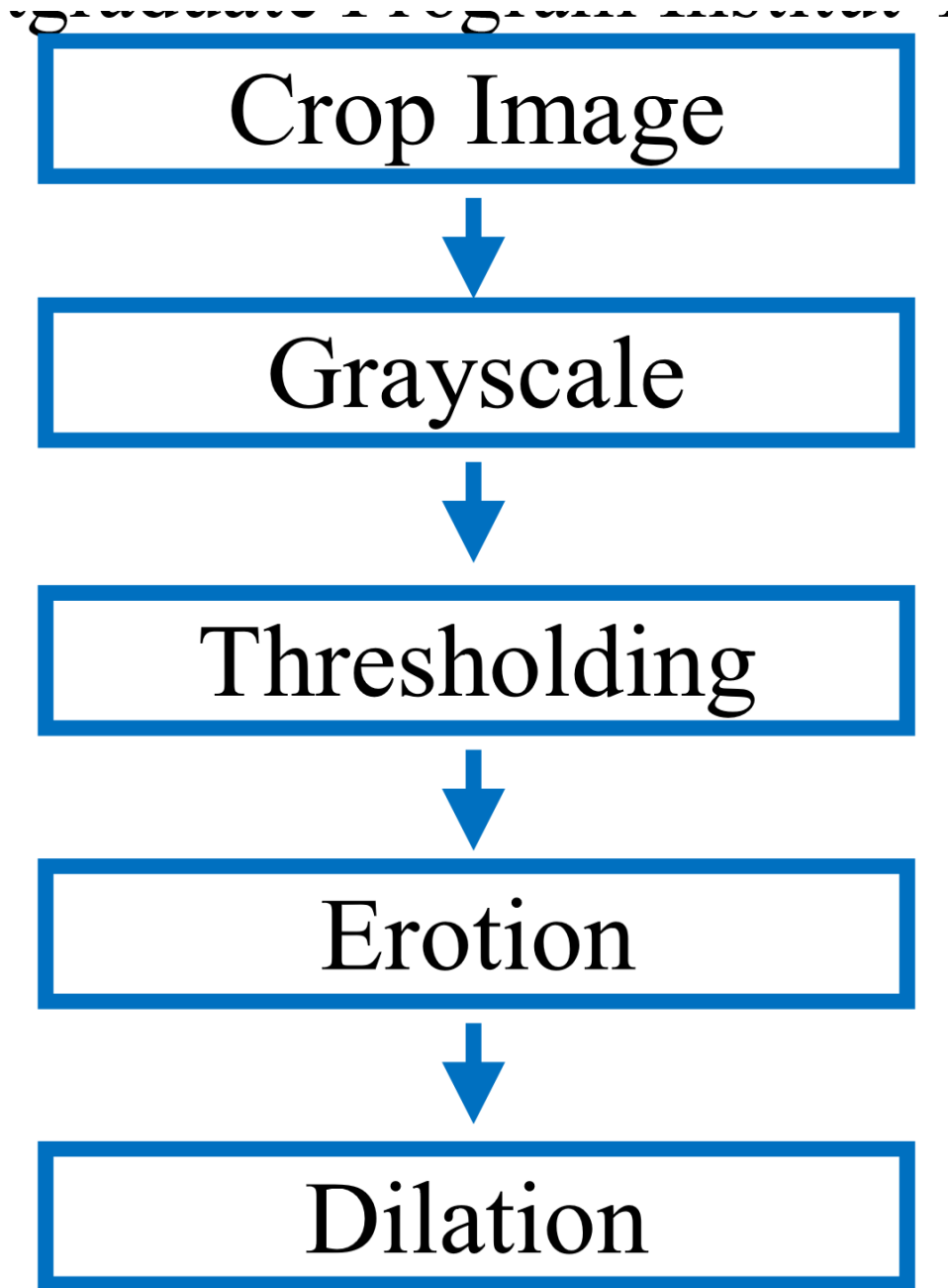
Methodology

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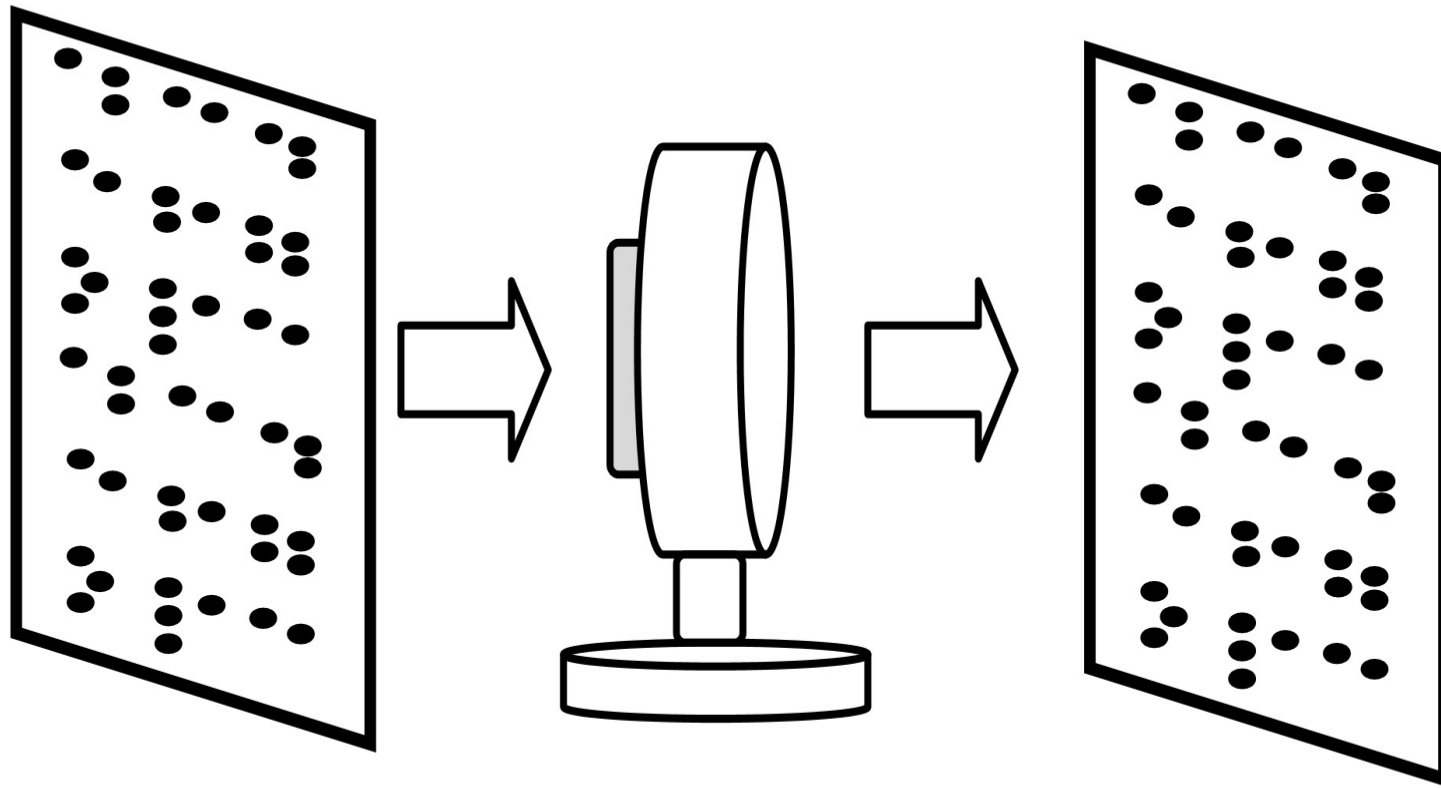
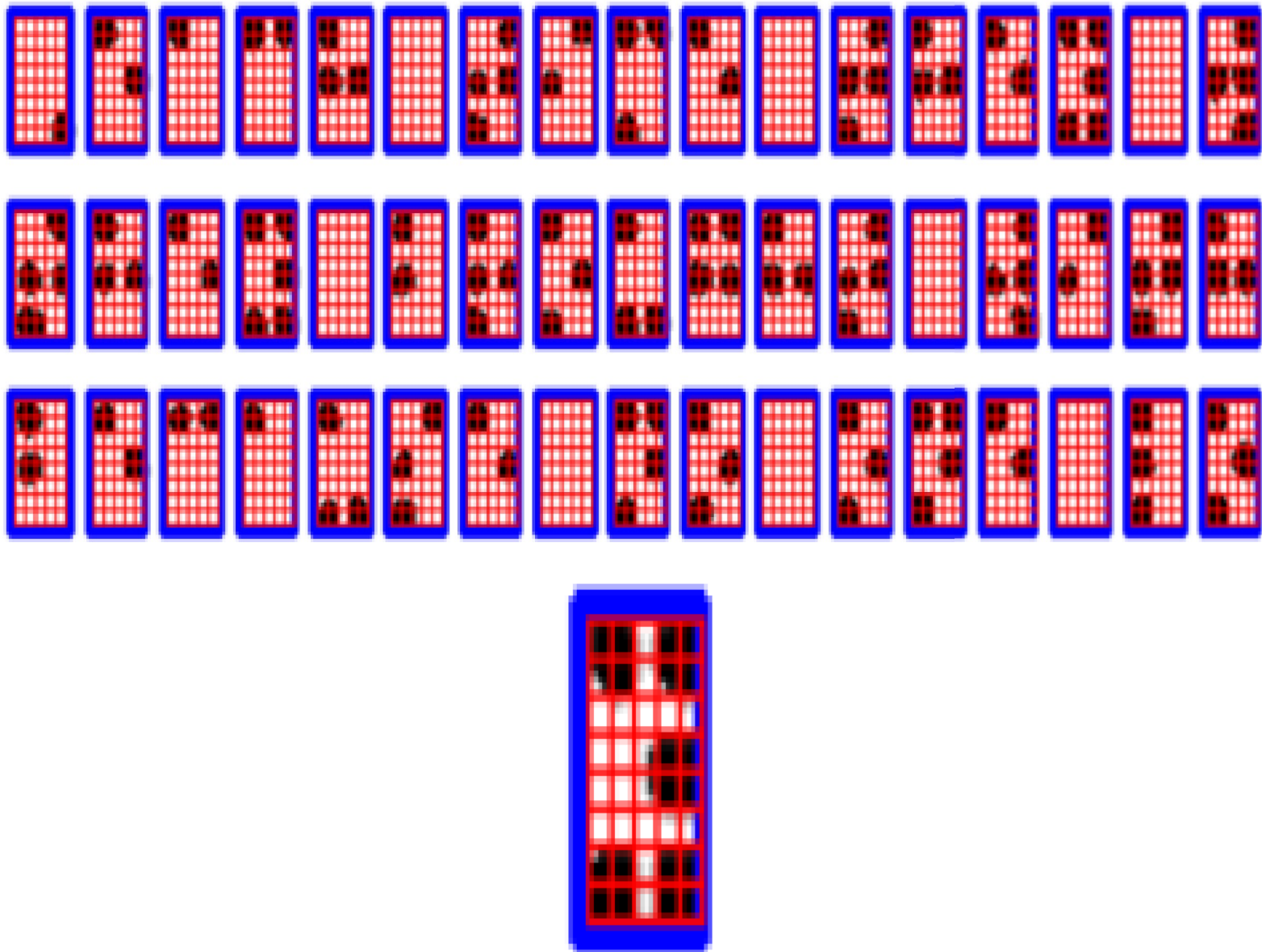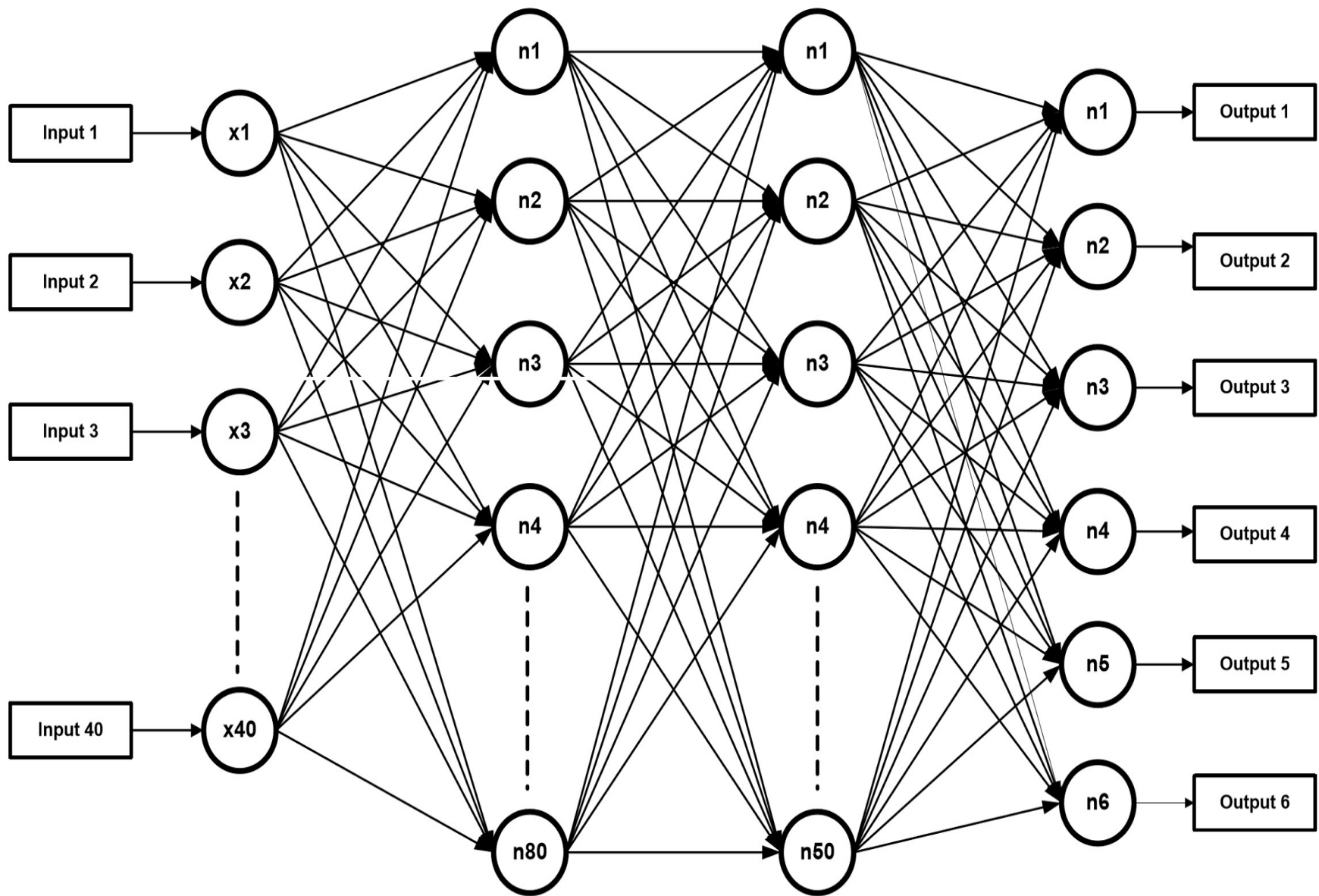Braille Paper   Webcam   Braille Image

Crop Image

↓

Grayscale

↓

Thresholding

↓

Erotion

↓

Dilation

Find coordinat (x,y)
using find contour

↓

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
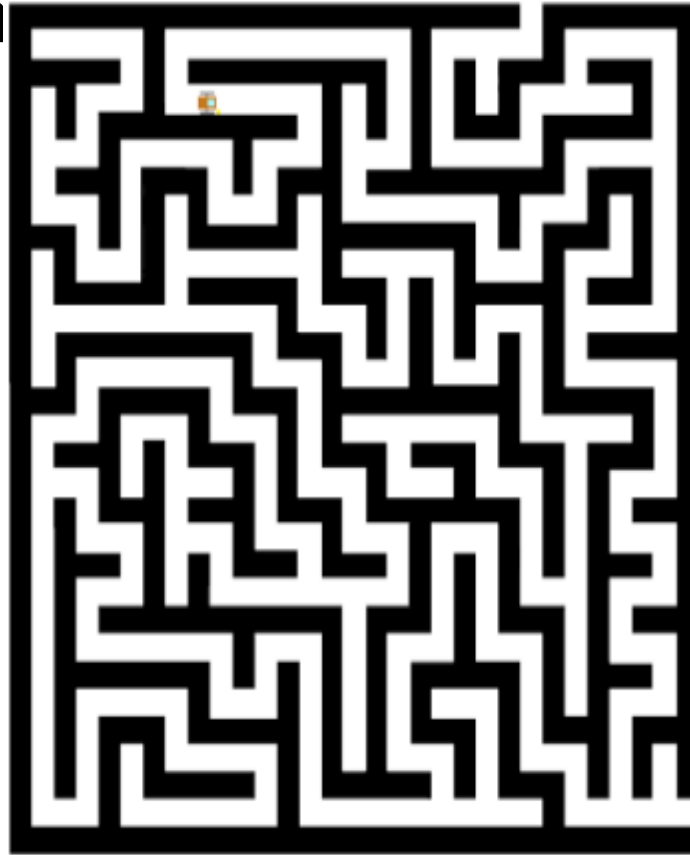- Literature Review
- Methodology
- References

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**
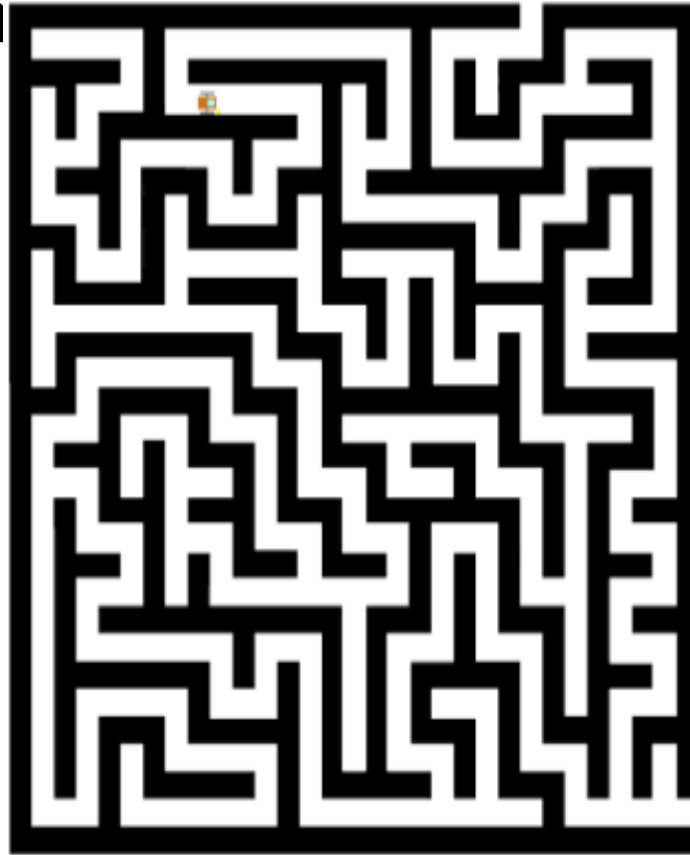 - **Path-finding** : employed as core of AI movement system [1]

Problem Statement

- The Maze Problem

Problem Statement
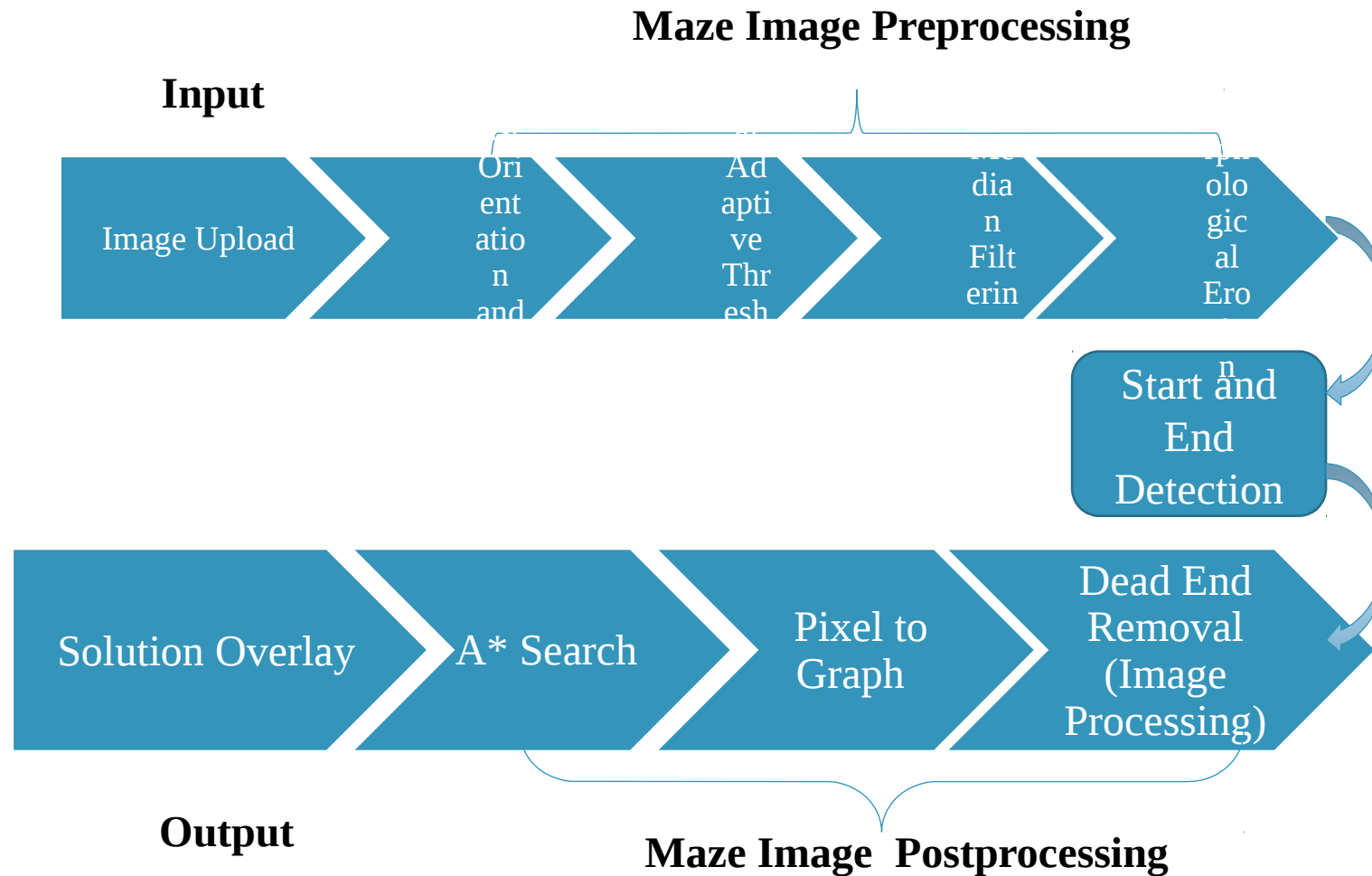
- The Maze Problem

Objective

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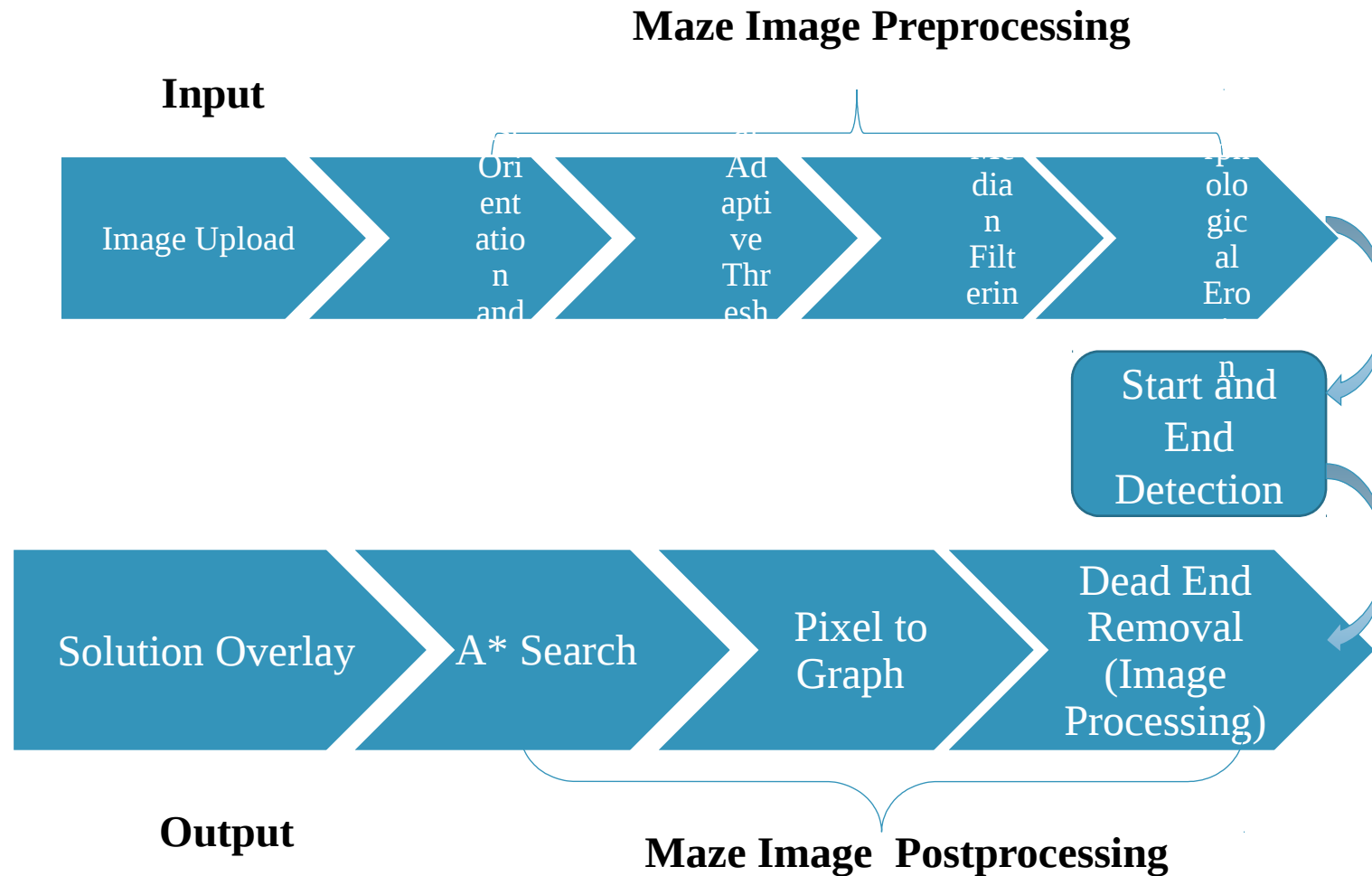
Literature Review

- 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

Maze Image Preprocessing

Input

Image Upload → Orientation and → Adaptive Thresh → Median Filterin → phological Erosion

Start and End Detection

Solution Overlay → A* Search → Pixel to Graph → Dead End Removal (Image Processing)

Output

Maze Image Postprocessing

63

Methodology

Maze Image Preprocessing

Input

Image Upload → Orientation and → Adaptive Thresh → Median Filtering → Morphological Erosion

Start and End Detection

Solution Overlay → A* Search → Pixel to Graph → Dead End Removal (Image Processing)

Output

Maze Image Postprocessing

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