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INDOOR NAVIGATION SYSTEM

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Abstract - *we propose the method that facilitates to navigate autonomously in previously unknown environment. The application developed in the project uses the Recursive Neural Networks approach to detect an input object classes . The image classier built which are responsible for extracting the features of the image. Using those features we can detect the objects and the path between those object by giving the source and destination points without the collision. The navigation is done by converting the input image and then processing it.*

***Key Words*: Recursive Neural Networks, image classier, collision, object classes, object classes**

1. INTRODUCTION

Tracking people, objects, and places became a very interesting field of research over the years. The replacement concept has been used in various areas of the application. For example, a person entering a new organization or building may find it necessary to follow an unfamiliar area and want to reach it immediately. In addition, internal navigation is very helpful in navigating a person within buildings such as hospitals and nursing homes, offices, organizations etc. Here we are with an internal navigation system that will help provide a way out. Currently, the navigation system of most mobile robots relies on the representation of a well-constructed terrain e.g., metric map. As a preliminary diagram, this type of representation demonstrates a strong reliance on low structural knowledge, such as certain natural geometric adjustments or low-level visual indicators, reducing its strength and durability. This is especially true of GPS-restricted areas, especially indoor spaces, where functions such as robotic architecture and planning / testing, rely heavily on natural representation. Like any other tragedy, the use of a low-level scale limits the robot's ability to communicate with human users, who often understand the environment, and refer to it, at a much higher level of gravity. Recently, so-called semantic mapping methods have emerged as a step forward to improve past boundaries. These methods, however, are often built on low-level geometric presentations, inherited from their many problems this paper proposes a model that can find a way based on real-time visual capture by the model and process visual data using a comprehensive learning algorithm. This is done in two parts, first the model has to see the objects in the interior and the second model can find the right way to go to the target area using the image algorithm.

1.1 Recursive Neural Network

When the same set of weights use a set of alternatives in the hope of finding a systematic prediction we are in when we discover a type of deep neural network that we call a repetitive network. Update networks that are flexible non-linear models can read in-depth structured information. RNN networks are very complex.

1.2 Deep Learning

"Deep learning is questionable" is a machine learning process that teaches computers to do what comes naturally to humans: learn by example. It can easily be used for informal predictions". Researchers and engineers are busy developing artificial intelligence using a combination of networks that do not have bio neural intelligence".

2. SYSTEM DESIGN

System design is the process of defining the construction of buildings, elements, modules, meeting space, and system data to meet specific needs. System design can be seen as the application of product development strategies. There is some variation in system analysis methods, system building and system engineering. System Innovation is one of the most important roles in software development. System naming is the first step from the root of the problem to the root of the solution. It is a very important factor affecting the quality of the software and especially in testing and saving. System Design is divided into different categories such as advanced design and detailed construction. It will identify the modules that should be in the system and specify about the modules and how they interact with each other to produce the desired result.

2.1 ARCHITECTURE DESIGN

Architecture is a concept that focuses on the objects or elements of a building. In the proposed system, we use the acquisition model that is restricted to locating objects. After the items are found the model creates a binding box around the object space. This box represents the size of an object. The model uses the Dijkstra algorithm to find the shortest path in between.

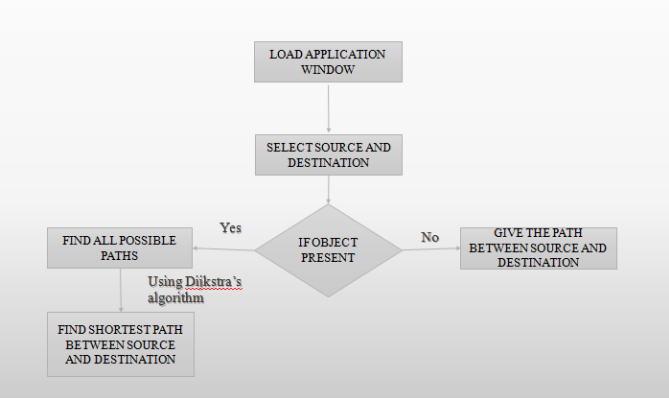

Fig -1: LOAD APPLICATION

As soon as the indoor navigation system application icon is clicked, it loads and opens.

Fig -2: INS icon

- **Input**

As our project is a target-driven application, the input for the app is an image of an environment in our case it is a college environment. And this image environment contains both source and destination as a target. There by increasing the accuracy of the solution.

- **Set source and destination**

Set source and Destination and find path Once the object is detected in the given environment image. As per the list of names of the location select any one for source and one for destination and enter the same in the source and destination dialogue box to select source and destination.

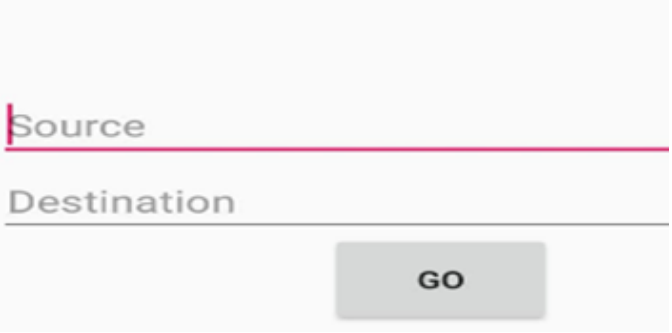

Fig -3: Source and Destination

If there is an object between the source and the destination the end-user must find all the means from that block using the box binding method and the djakstra,s algorithm is applied to that object and the shortest route is calculated.

• Object Discovery and Digital Algorithm

If there is an object between the source and the location where the user should find all possible and subsequent methods, the user should choose the shortest route available using the digestor algorithm. If something hinders navigation, it is a barrier between the source and the destination. As soon as the user approaches the obstacle detected by the binding box, the djakstra ‟s algorithm detects the obstacle and measures all possible paths from the obstacle to the location and selects the shortest route from now on.

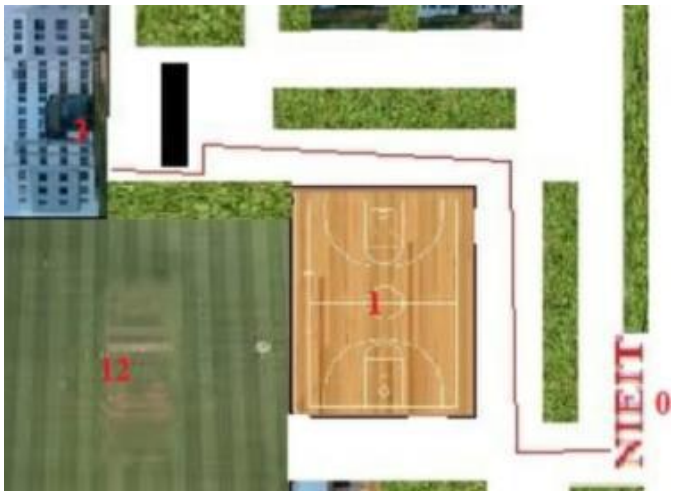

Fig -4: Object detection

The image environment is divided into regions and predicts binding boxes and opportunities for each region. These interlocking boxes are weighted with predictable possibilities.

As we can see in the above figure that, the black box present between the source 0 and the destination 3 is the obstacle. This obstacle is detected by the bounding box present in the layout using **x** and **y** co-ordinates. As soon as the obstacle is detected an alert message is displayed **"Alert Object Detected"** and the dijakstra‟s algorithm is applied to find all possible paths from the obstacle to the destination. Finally, algorithm chooses the shortest path among all other possible paths and reaches the destination.

The dijkstra algorithm allows you to calculate the shortest path between the one path you choose with all other areas and is a small-sized tree algorithm and we build a SPT (short path tree) with a given source as root and maintain two sets, one set contains vertices embedded in the tree for a shortcut, some sets include vertices that have not yet been installed on the shortcut tree. In every step of the algorithm, we find a

vertex in this set (not set) and a short distance from the source.

3. IMPLEMENTATION

Indoor navigation implementation is done on two software applications that contain an algorithm to locate objects and a second to follow the path.

Our system separates the input image from the grid. If the center of an object falls into a grid cell, that cell grid is responsible for finding that object. Each cell grid predicts B-box combinations and confidence symbols for those boxes. How do these self-confidence schools become the model content that the box contains something and how accurate it thinks the box predicts. If nothing is present in that cell, the confirmation notes should be zero. Otherwise we want the amount of confidence equal to the over-the-counter (IOU) road between the predicted box and world reality. Each binding box contains 5: x, y, w, h, and confidence guesses. Link (x, y) represents the center of the box relative to the grid cell boundaries. The width and height of the forecast are related to the whole image. Ultimately confidence prediction represents the IOU within the predictive box and any basic truth box. Each cell grid predicts C-class chances, This can be found in a grid cell containing something. We predict only one set of classroom power per single grid, regardless of the number of boxes B. During testing we multiply the probability of conditional items and the assumptions of a single box, Pr (classobject) x Pr (Object) x IOU follow-up point = Pr (Classi) x Outruth pred (1) gives scores specific accuracy of each box category. These schools lock both of them into the possibility of that class appearing in a box and how the predicted box fits into something.

When an object is found it places a binding box around the object, the binding box represents the size of the object which means it represents the space used by the object. Then a box is removed which is removed using these links and source again.

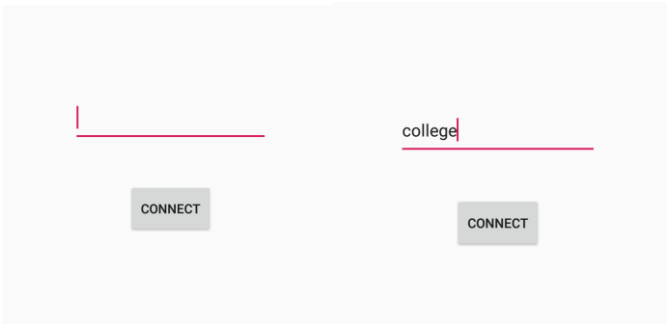

Fig -5: User view of the application

Here, as soon as the user opens the app icon it shows the above user view of the application. Where the user has to enter the URL, but in our case it connects to college URL by default even if no URL is entered.

Fig -6: Layout with labels

Here, each location is labeled due to user-friendly process. The users can enter either number or the label as a source and destination. And the college layout is the **image** input.

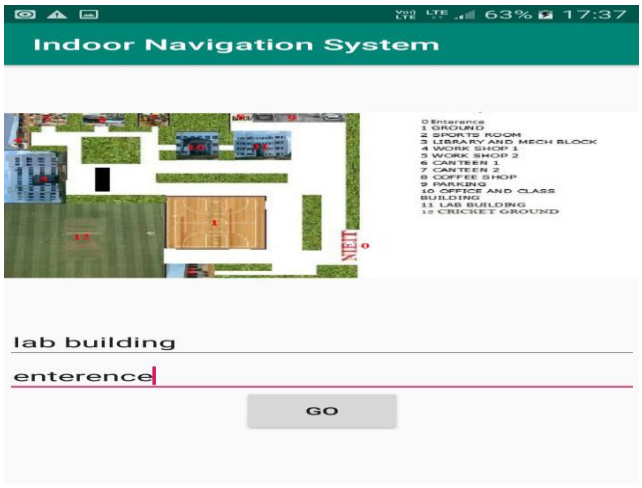

Fig -7: Source and destination

Fig -8: Path between given sources and destination

4. CONCLUSION

The main idea of our design is to navigate the path autonomously without having to use any sensors in an unknown indoor environment. This design can be used in any unmanned drones, vehicles or home appliances like vacuum cleaner etc to navigate through the indoor environment without having any collisions. This type of design which does not depend on any network or GPS is much more reliable in the indoor conditions where there may be problems with the connectivity.

REFERENCES

[1]. **"Recursive neural networks for object detection"** M. Bianchini, M. Maggini, L. Sarti, E Scarselli Dipartimento di Ingegneria dell'hformazione Universiti degli Studi di Siena.

[2]. "**Target-driven Visual Navigation in Indoor Scenes using Deep Reinforcement Learning**" Yuke Zhu1 Roozbeh Mottaghi2 Eric Kolve2 Joseph J. Lim1 Abhinav Gupta2,3 Li Fei-Fei1 Ali Farhadi2,4 1Stanford University, 2Allen Institute for AI, 3Carnegie Mellon University, 4University of Washington.

[3]. **"Dynamic Recursive Neural Network"** Qiushan Guo1, Zhipeng Yu2, Yichao Wu2, Ding Liang2, Haoyu Qin2, Junjie Yan2 „Beijing University of Posts and Telecommunications 2SenseTime Group Limited.

[4]. A.Araneda, S. Fienberg, and A. Soto, **A statistical approach to simultaneous mapping and localization for mobile robots**,Annals of Applied Statistics, vol. 1, no. 1, pp. 6684, 2007.

[5]. J. Fuentes-Pacheco, J. Ruiz-Ascencio, and J. Rendon-Mancha, **Visual simultaneous localization and mapping: a survey**,Artificial Intelligence Review, vol. 43, no. 1, pp. 5581, 2012.

[6]. I.Kostavelis and A. Gasteratos, **Semantic mapping for mobile robotics tasks: A survey**,Robotics and Autonomous Systems, vol. 66, no. 103, pp. 86103, 2015.

[7]. Busra Ozdenizci, Kerem Ok, Vedat Coskun, Mehmet N. Aydin. (2011). **"A Deep Learning Based Behavioral Approach to Indoor Autonomous Navigation"**. [Accessed 12 May 2019].