DEPARTMENT OF COMPUTER SCIENCE & ENGINEERING

BANGLADESH ARMY UNIVERSITY OF SCIENCE & TECHNOLOGY (BAUST)

SAIDPUR CANTONMENT, NILPHAMARI

(Project Proposal)

Course Code: CSE 4132 **Course Title:** Artificial Neural Networks and Fuzzy Systems Sessional

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1. **Name of the Students (with ID) :**
   - Muhiminul Islam(200101074)
   - Susmita Roy Rinky(200101081)
   - Md Mahbubur Rahman Tusher(200101100)

2. **Present Address** **:** Bangladesh Army University of Science & Technology (BAUST), Saidpur Cantonment, Saidpur, Nilphamari.

3. **Name of the Department :** Computer Science & Engineering

   Program **:** Bachelor of Science in Computer Science and Engineering

4. **Tentative Title** **:** Deep-Learning-Based Bangladesh Traffic Signs Recognition

5. **Introduction**

In computer vision and intelligent systems, traffic scene analysis is a crucial subject [1-6]. Traffic signs are intended to notify drivers of the present state of the road and other crucial information. They have unbending, straightforward forms with vibrant colors that are simple to interpret. Nonetheless, when vehicles fail to see a traffic sign in time, accidents may still happen. Designing an autonomous real-time driver assistance system that can detect and understand traffic signs is therefore crucial.

To solve this problem, we put out a proposal to create a system for identifying traffic signs in actual photographs in accordance with Bangladeshi traffic sign regulations. Modern computer vision methods and deep learning algorithms will be used by the proposed system to identify traffic signs in pictures taken at various angles and in various lighting situations. Dataset of traffic signs unique to Bangladesh will be used to train the system. These signs will be annotated and made available to the scientific community.

The suggested technology offers precise and effective traffic sign detection, which has the potential to greatly increase road safety in Bangladesh. The technique is a useful addition to the field of computer vision and autonomous driving since it may be applied to other nations with comparable traffic sign regulations.

6. Background and Present State of the Problem

Due to the numerous incidents that happen on Bangladesh's roadways, this country has a serious problem with road safety [7-8]. A World Health Organization research cites Bangladesh as having one of the highest global rates of traffic fatalities [9]. The nation's roadways are characterized by dense traffic, a lack of traffic control systems, and inadequate infrastructure. However, many cars disobey traffic laws, and the roads are frequently dimly lighted, making it challenging for drivers to navigate safely.

The precise and effective detection of traffic signs, which may give drivers crucial information about the laws of the road, is one of the essential elements of road safety. However, detecting traffic signs in real-world images is a challenging task, particularly in a country like Bangladesh, where the road conditions are unique and the traffic signs have different shapes, colors, and symbols.

Traffic sign detection is currently well-studied and broad field of research. The survey by Møgelmose et al. [10] provides detailed analysis on the most recent developments. Most approaches make use of two prominent features of traffic signs: color and shape. Due to diverse natural lighting conditions the treatment of color is difficult and many heuristics have been applied [6], [11]. Regarding shape, one can say that two paradigms are currently persued: model-based and Viola-Jones-like methods. The model-based approaches rely on robust edge detection and aim at connecting them to regular polygons or circles [12], [13], usually via a Hough-like voting scheme or template matching. The Viola-Jones-like detectors compute a number of fast and robust features and try to identify trained patterns by use of different possibly weak classifiers [14].

Although there has been a lot of study in the field of traffic sign detection, the majority of the systems that are now in use were created for Western nations and may not be adequate for Bangladesh's particular circumstances. Also, it's possible that Bangladesh's whole set of traffic signs won't be picked up by the current systems.

Consequently, it is necessary to create a system that can recognize traffic signs in real-world photos reliably and effectively, especially in accordance with Bangladesh's traffic sign criteria. A similar method might be used in other developing nations with comparable traffic sign requirements, potentially improving road safety in the nation.

7. Objective with Specific Aims and Possible Outcome

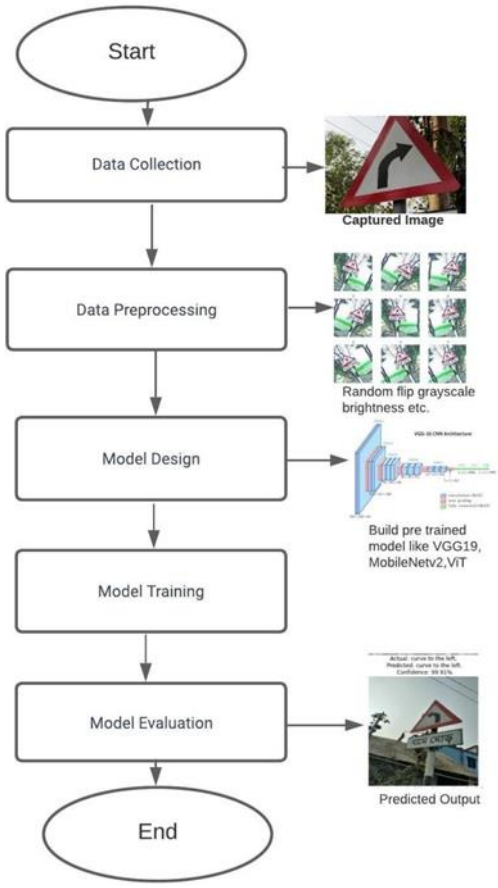
To develop a traffic sign recognition system using Convolutional Neural Networks (CNN) for Bangladesh images.

- Collect and preprocess a dataset of traffic sign images in Bangladesh.
- Design and train a CNN model that can accurately recognize traffic signs in Bangladesh images.
- Evaluate the performance of the CNN model.

The possible outcome of this project is the development of a highly accurate traffic sign recognition system**.**

8. Outline of Methodology Design

The methodology for developing a deep learning-based system for the detection of traffic signs in real-world images, according to the traffic sign specifications of Bangladesh, can be divided into the following steps:



The resulting deep learning-based system will provide an accurate and efficient solution for the detection of traffic signs in real-world images, specifically according to the traffic sign specifications of Bangladesh. The system will be able to detect a wide range of traffic signs in images captured under different lighting and weather conditions, which will improve road safety in the country.

9. Resources Required to Accomplish the Task

The resources required to accomplish the task of developing a deep learning-based system for the detection of traffic signs in real-world images, according to the traffic sign specifications of Bangladesh, include:

Hardware: High-performance computing resources, such as GPUs, are required to train deep learning models efficiently. A powerful computing system with a high-end GPU is required for training the model.

Software: A range of software tools and libraries will be needed, including deep learning frameworks such as TensorFlow, Keras as well as image processing libraries like OpenCV. The appropriate tools and libraries will be selected based on the requirements of the project.

Dataset: A large, diverse dataset of traffic sign images specific to Bangladesh will be required for training and validation of the deep learning model. The dataset should be comprehensive and include images captured under different lighting and weather conditions.

Budget: The project will require a significant budget to cover the cost of hardware, software, dataset creation and annotation, and human resources. The budget should be allocated to ensure that the necessary resources are available to accomplish the task efficiently.

10. References

[1] Z. Zhang, T. Tan, K. Huang, Y. Wang, Practical camera calibration from moving objects for traffic scene surveillance, IEEE Trans. Circuits Syst. Video Techn. 23 (3) (2013) 518–533.

[2] Z. Zhang, K. Huang, Y. Wang, M. Li, View independent object classification by exploring scene consistency information for traffic scene surveillance, Neurocomputing 99 (2013) 250–260.

[3] C. Yao, X. Bai, W. Liu, L. Latecki, Human detection using learned part alphabet and pose dictionary, in: Proc. of ECCV, 2014.

[4] C. Hu, X. Bai, L. Qi, X. Wang, G. Xue, L. Mei, Learning discriminative pattern for real-time car brand recognition, IEEE Transactions on Intelligent Transportation Systems 16 (6) (2015) 3170–3181.

[5] Y. Xia, W. Xu, L. Zhang, X. Shi, K. Mao, Integrating 3d structure into traffic scene understanding with rgb-d data, Neurocomputing 151 (2015) 700–709.

[6] Q. Ling, J. Yan, F. Li, Y. Zhang, A background modeling and foreground segmentation approach based on the feedback of moving objects in traffic surveillance systems, Neurocomputing 133 (2014) 32–45.

[7] Mahmud, SM Sohel, Md Shamsul Hoque, and Abdus Shakur Qazi. "Road safety problems in Bangladesh: some major initiatives, constraints and requirements." Transport and Communications Bulletin for Asia and the Pacific 79 (2009): 61-89.

[8] Mahmud, SM Sohel, Md Shamsul Hoque, and Q. A. Shakur. "Road safety research in Bangladesh: constraints and requirements." The 4th Annual paper meet (APM) and the 1st Civil Engineering Congress, organized by Civil Engineering Division Institution of Engineers, Bangladesh (IEB), Session V: Transportation Engineering-II. 2011.

[9] Global status report on road safety 2018. In: World Health Organization. https://www.who.int/publications/i/item/9789241565684. Accessed 1 Mar 2023.

[10] A. Møgelmose, M. Trivedi, and T. Moeslund, "Vision based traffic sign detection and analysis for intelligent driver assistance systems: Perspectives and survey," IEEE Transactions on Intelligent Transportation Systems, Special Issue on Machine Learning for Traffic Sign Recognition, 2012.

[11] A. Arlicot, B. Soheilian, and N. Paparoditis, "Circular road sign extraction from street level images using colour, shape and texture database maps," in Proceedings of the Workshop on City Models, Roads and Traffic, 2009.

[12] N. Barnes, G. Loy, D. Shaw, and A. Robles-Kelly, "Regular polygon detection," in Proceedings of the International Conference on Computer Vision, 2005, pp. 778–785.

[13] R. Belaroussi and J.-P. Tarel, "Angle vertex and bisector geometric model for triangular road sign detection," in Proceedings of the IEEE Workshop on Applications of Computer Vision, 2009, pp. 577–583.

[14] K. Brki´c, A. Pinz, and S. Segvi´c, "Traffic sign detection as a component of an automated traffic infrastructure inventory system," in Proceedings of the annual Workshop of the Austrian Association for Pattern Recognition, 2009, pp. 1–12.

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Muhiminul Islam(200101074)	
Susmita Roy Rinky(200101081)	
Md Mahbubur Rahman Tusher(200101100)	