High-Speed Logo Scan Algorithm using Neural Networks

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Video: https://youtu.be/lPABP6tnBQE

Video

Project Objectives:

This project is an experiment to design, develop and test a set of Neural Networks to detect logos on printed materials. Two different types of networks are designed and tested, and the results are compared. To deploy them on real-time basis, an improved design is proposed that can optimise the GPU usage time.

Rationale:

In the advertising world, especially in the print media, the designers shy away from using QR codes as they are ugly. One solution is to use Company Logos. This project focuses on the development of a fast-algorithm that can match the performance of a typical QR code reader.

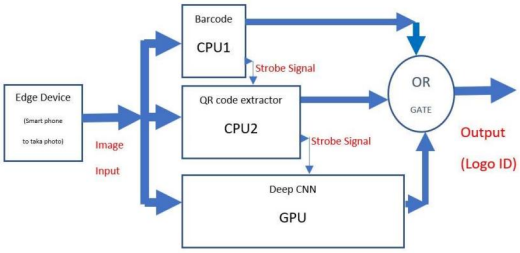


Figure 1: System Architecture

Bar code for "www.stanford.edu"	QR code for "www.stanford.edu"	Logo
Barcode reader	QR code reader	CNN for Logos

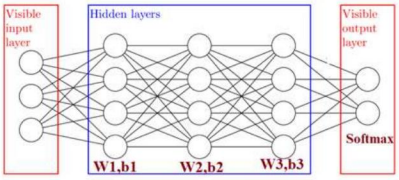
Table:2 The edge device may have multiple scenarios.
Note: This project focuses only on the Neural Network development for Logo Identification

Apple	BMW	Mc Donald's	Nike	Stanford	Wendy's

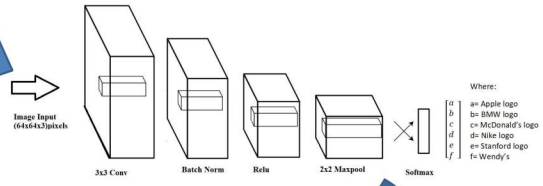
Table 1: The set of logos used for training

When there are multiple CPUs/GPUs running concurrently, a mechanism using "STROBE" signal to stop the slow processes based on the fastest 'successful' network is mooted as shown in Figure-1

In this project the development of the Logo Identifier is the focus; for which 2 different models of neural networks are developed, tested and the results are compared.



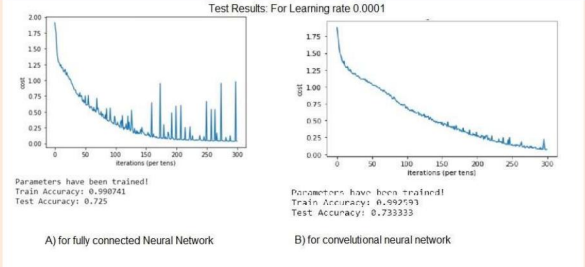
Model-1



Model-2

Results:

The CNN model performed better than fully connected network.



A) for fully connected Neural Network

B) for convelutional neural network

The CNN Model is expandable to accommodate millions of logos

Conclusion and Future Work

- Port the application as an iOT using NVIDIA Jetson Nano
- Bundle it as an API so that the smart phone applications can access it conveniently
- Implement deeper CNN to improve the accuracy
- Train the network with larger number of Logos

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