Logo Detection and Classification

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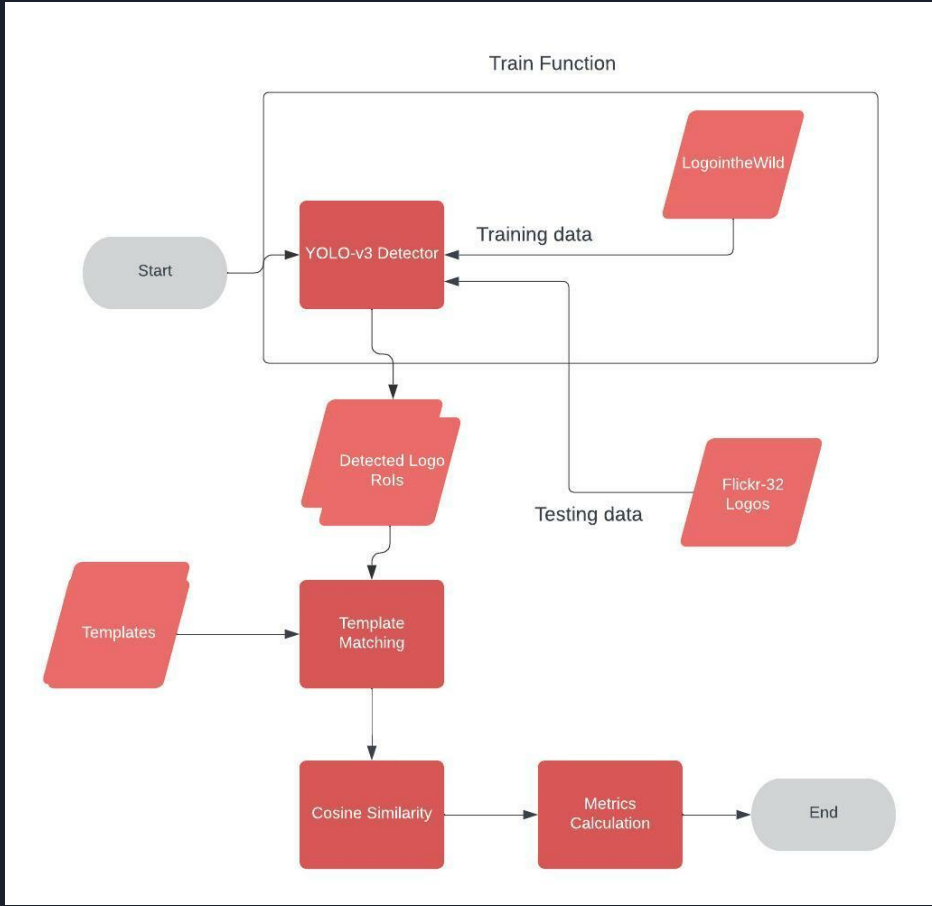
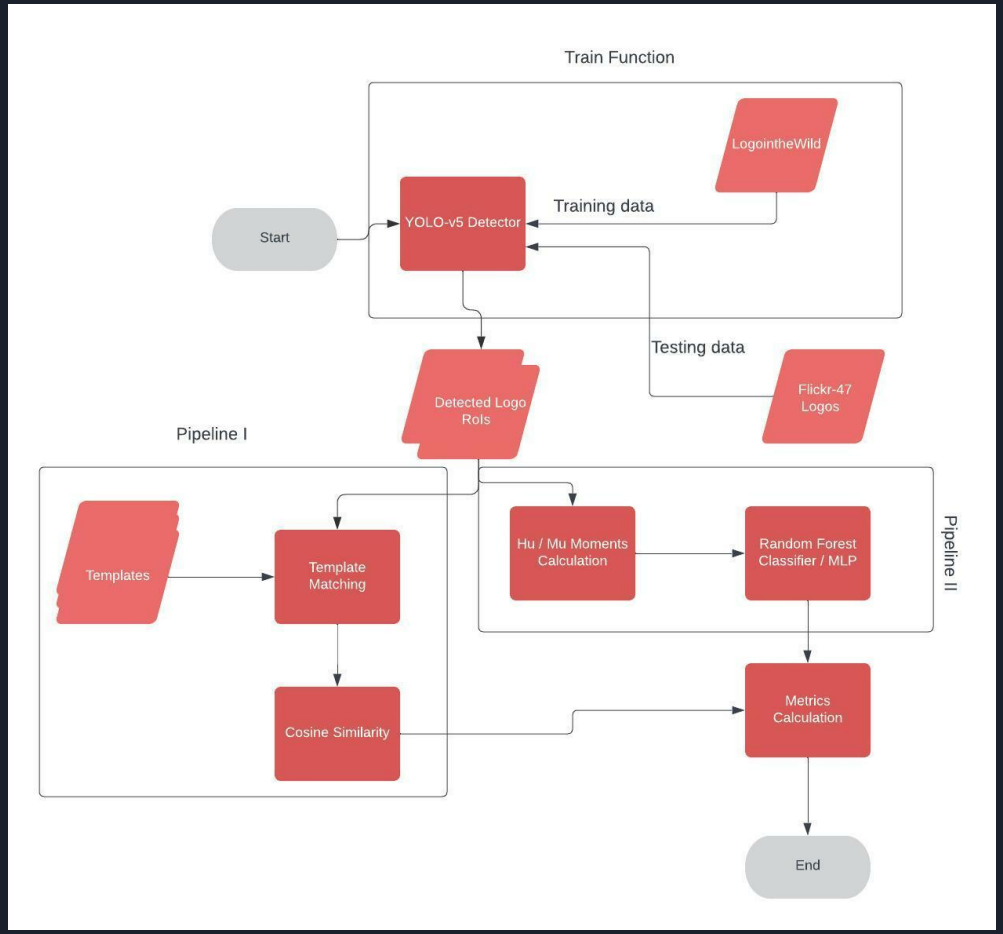
Introduction

Logo detection and classification is a subset of the object classification domain in computer vision, concerning logos of popular brands. There is a huge real world use case of classifying logos effectively – it can be used for advertisement effectiveness tracking and measuring brand reach. We propose to implement the approach in (Tuzko et al., 2017) from scratch with a few modifications, and then extend it. Specifically, traditional approaches focus on seeing logo classification as a image problem but we also treat it as a separate ”character” identification problem for textual logos. We discuss our approach, extensions, results and challenges faced.

Architecture diagram of reproduced system



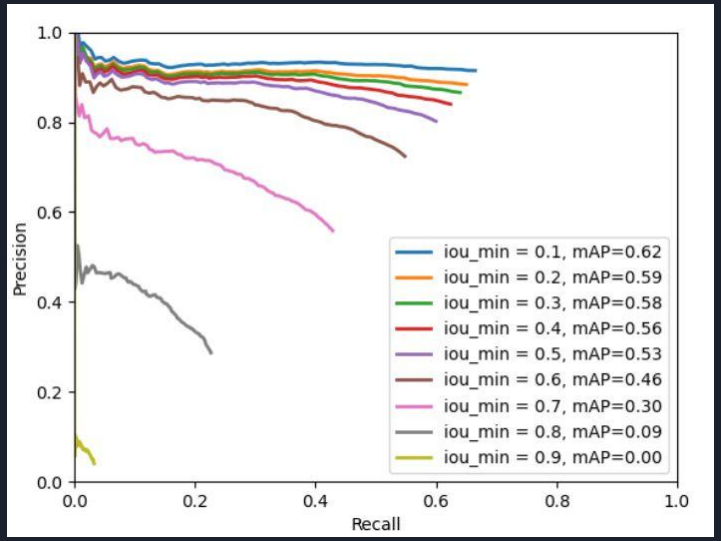
Architecture diagram of proposed system



Results - Reproduced

P-R curve at various IoUs for YOLO-v3 Detection

Our mAP = 0.53 Author's mAP = 0.464



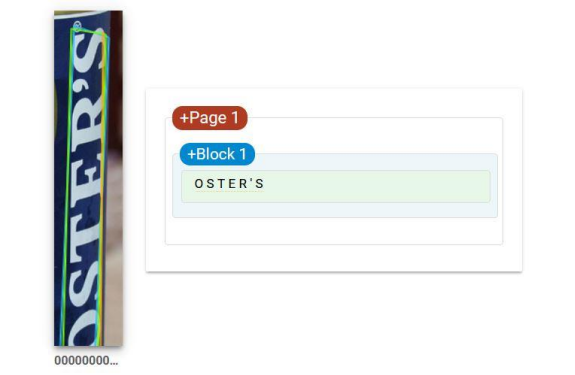
mAP for closed set Faster-RCNN

Our mAP = 0.74 Author's mAP = 0.81

Results - Enhancement

Mean Average Precision of YOLO-v5 detector

mAP = 0.72 @ IoU of 0.5



Classification Method	Classification Accuracy
Cosine Similarity between detected ROI and logo templates	22.565%
Hu/Nu Moments of detected ROI + Random Forest Classifier	3.533%
Hu/Nu Moments of detected ROI + Multi Layer Perceptron	4.126%

Conclusion

The problem of logo detection and classification is a very specific one with real-world use cases. It can be solved using two approaches: closed set and open set, but for the proposed approach to mirror the real world the best, it has to be an open set system. In this vein, we tried and successfully reproduced the open set detection results in (Tuzko et al., 2017). We also recognized that logos can be both abstract and textual and tried to augment our detection and classification pipeline with a better detector and OCR. For the classification task, we tried multiple classification methods and found that cosine similarity produces the best results.

Future Work

- Use more and higher quality templates to improve logo classification results using cosine similarity.
- Use better OCR techniques to enhance the classification accuracy of text-based logos.
- Try various data augmentation techniques, like adding noise, rotating images etc. to generate a more robust model.

References

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