Automatic Bangla Digital Number Plate Detection & Recognition System using Image Processing & Deep Learning

Noshin Faria, Plabon Banik , Amit Majumder, Adri Saha
Department of Computer Science & Engineering, East West University

OBJECTIVE

The principal objective of this study is

- to propose a system that can detect and extract a number plate from an image,
- localize characters, segment them from a number plate, and
- Finally, recognize those characters to collect the license plate's number.

METHODOLOGY

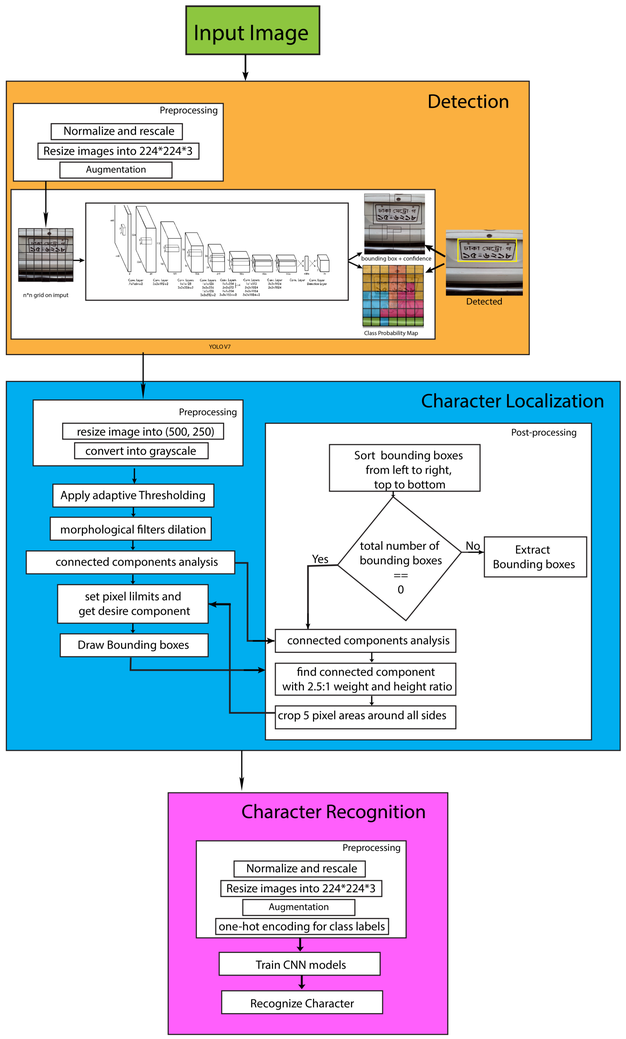


Figure 01: Workflow Diagram

EXPERIMENTAL RESULT

Table 1: Experimental Results of Number Plate Detection

Model Name	Accuracy	Precision	Recall	mAP@.5	mAP@.5:0.95:
YOLO V7	0.91	0.994	0.901	0.938	0.827
Image Processing Techniques	–	0.936	0.915	–	–

Table 2: Experimental Results of Character Localization

Method	Accuracy (%)
YOLO V7	91.38%
Others(using same dataset)	89.10%

Table 3: Experimental Results of Character Localization

Precision	Recall
0.85	0.97

Table 4: Experimental Results of Character Localization

Model Name	Loss	Accuracy	Precision	Recall
Inception	0.3522	0.8696	0.8807	0.8587
VGG16	0.5226	0.9157	0.9187	0.8413
VGG19	0.5379	**0.9369**	0.9127	**0.9476**
Xception	0.3726	0.9026	**0.9539**	0.8261
DenseNet	**0.3254**	0.8985	0.8994	0.8565
Inception	0.3574	0.8312	0.8801	0.8220

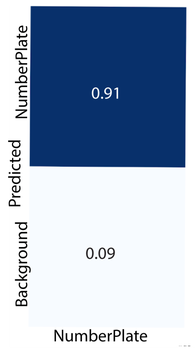


Figure 04: Confusion Matrix of YOLO V7 model

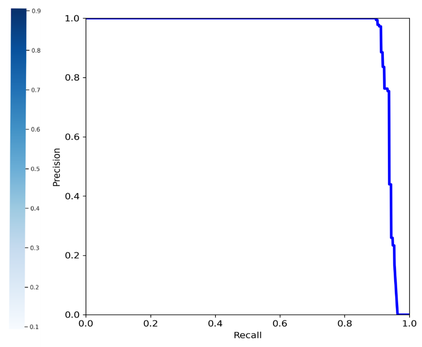


Figure 05: Precision recall curve of YOLO

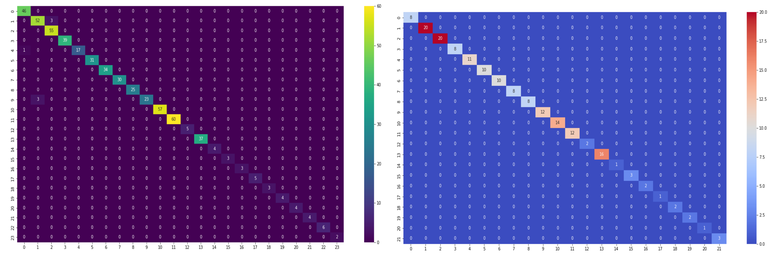
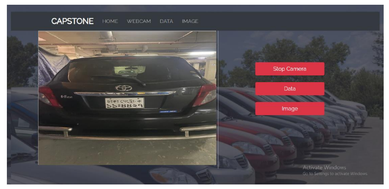
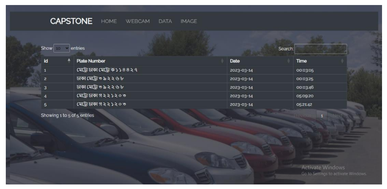


Figure 06: Confusion Matrix of VGG19 in train & test phase

IMPLEMENTATION OF WEBSITE





Used Technologies :

Flask MySQL HTML CSS JS Bootstrap

EARN VALUE MANAGEMENT

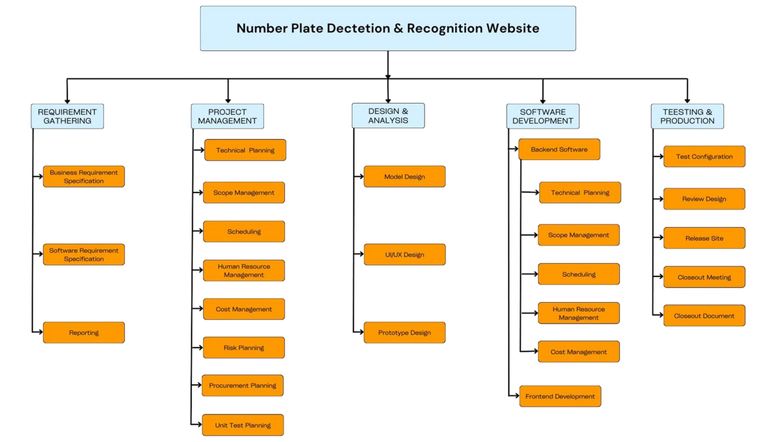
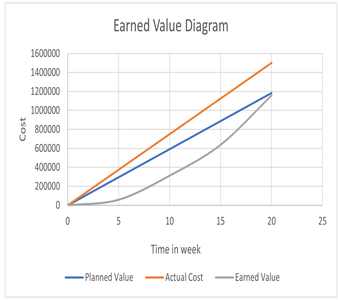


Figure 07: Work Breakdown Structure (WBS)

COST CALCULATION & EARNED VALUE DIAGRAM

Cost Factor	Resourses	Duration(Days)	Budget
1 Requirement Gathering	Materials	2 Week	5000
2 Project Management	Spreadsheet software	3 Week	10000
3 Design & Analysis	Designing tools, visualization & analysis tool	3 Week	40000
4 Software development	workspace, database, security certification, version controller	8 Week	1,00,000
5 Testing & Production	unit testing tools, hosting service	4 Week	30000
Total			1,85,000
Staff			
Project Manager(1 person)		5 Months	425,000
Business Account Officer(1 person)			166,666
Senior Developer and Designer(1 person)			212,500
Junior developer(4 person)			83,333
Quality Assurance Officer(1 person)			111,111
Total			998,610
Total Cost of the Project			1,183,610



Supervised By

Dr. Md. Nawab Yousuf Ali
Professor
Department of Computer Science and Engineering
East West University

References

- Islam, R., Islam, M.R. and Talukder, K.H., 2020. An efficient method for extraction and recognition of bangla characters from vehicle license plates. *Multimedia Tools and Applications*, *79*(27), pp.20107-20132
- Chandra, S., Nowshad, M.A.A. and Islam, M.J., 2017, December. An automated system to detect and recognize vehicle license plates of Bangladesh. In *2017 20th International Conference of Computer and Information Technology (ICCIT)* (pp. 1-6). IEEE.
- Shaifur Rahman, M.M., Shamima Nasrin, M., Mostakim, M. and Zahangir Alom, M., 2018. Bangla License Plate Recognition Using Convolutional Neural Networks (CNN). *arXiv e-prints*, pp.arXiv-1809.
- Islam, M.A., Chowdhury, G.M. and Haque, M.N.M., 2021, May. Bangla License $_{Plate}$ Detection, Recognition and Authentication with Morphological Process and Template Matching. In *2021 2nd International Conference for Emerging Technology (INCET)* (pp. 1-6). IEEE.