Paper ID
1092

Title
BanglaPlate: Automated Vehicle Number Plate Detection and Recognition using YOLOv8

Letter to Editor and Reviewer:

Dear Respected Editor & Reviewer,

I hope you are doing well.

I am grateful for this chance to enhance our article. We deeply value your critical feedback together with your suggestions because it substantially improves the quality of our work. The revised version addresses every issue highlighted in the original manuscript to fulfill our expectations.

Your dedication in assessing our study is truly appreciated once again.

Reviewer Comments and Response

Reviewer point #1: I could not find new contributions or new ideas.

Author response #1:

We genuinely value the effort and time dedicated by the reviewer in evaluating our work. We recognize the significance of presenting fresh research findings and we use this occasion to explain distinct components in our study.

The research project presents BanglaPlate: Automated Vehicle Number Plate Detection and Recognition as a system developed to solve specific challenges associated with the recognition of Bangla license plates because this format differs greatly from standard Latin-based license plate systems. The main distinctive features of this work include:

1. Our solution addresses the specific needs of the Bangla script by tailor-making an approach for detecting Bangla plates which contain difficult curves as well as overlapping characters and distinct structural complexities.
2. Our team built a specialized Bangla license plate database through detailed annotation with Roboflow which established high-quality training material. According to our research there are few such datasets which exist in public repositories.

3. The integration of YOLOv8 with EasyOCR operates as a detection-recognition system for Bangla plates delivering 1.52% CER and 5.53% WER which outperforms present solutions.
4. The system detects plates successfully in real-world conditions including warped plates, partial plate coverage, and changing lighting conditions with a high detection accuracy ranging from 93% to 96%.
5. This paper examines Bangladeshi intelligent transportation platforms that could benefit from our system by extending future research.

We thank the reviewer for their concerns after which we underline the distinctive features of our research through this clarification. Updates to the manuscript improve its emphasis on the distinctive aspects of our research work.

Your comments hold great value to us while we also accept additional guidance for maximizing the clarity along with impact of our work.

Reviewer point #2: Figures are not clear.

Author response #2:

We appreciate the important suggestions provided by the reviewer. Our manuscript benefits greatly from the use of high-quality figures that improve both readability and comprehension.

The manuscript now contains clearer figures that resulted from our improvement work based on this feedback. The figures go through revision that produces enhanced image quality together with improved contrast which makes essential details more distinguishable. The figure captions have been reformulated to offer a clear description of each figure.

The reviewer noted this observation and our team took action to improve the figures through necessary adjustments.

Your helpful feedback is once more appreciated.

Reviewer point #3: Reference writing style is not good.

Author response #3:

We express immense gratitude to the reviewer because of their informative comments. The correct use of a standard reference format becomes essential for both readability and professional presentation in academic manuscripts.

We revised our reference formatting standards in response to this feedback by following the reference rules of the conference. A complete review process confirmed consistent citation order and proper formatting as well as essential information in every reference.

Our team has addressed all necessary improvements after recognizing the reviewer's thorough examination.

Your thoughtful comment is again much appreciated.

Reviewer point #4: Need recent works discussion.

Author response #4:

This vital suggestion from the reviewer receives our genuine gratitude. The research benefits greatly from using contemporary studies that complete the overall context.

We revised the Related Works section to add an analysis of modern studies about vehicle number plate detection and recognition, especially methods studying Bangla license plates combined with deep learning techniques. Recent references we've added to the text reveal current field progress and establish the connection of our work with existing methods.

The recommendation for needed revisions has produced positive results which we appreciate from the insightful reviewer.

I express gratitude for your precious input.

Reviewer point #5: Need to compare results with some recent papers from 2024–25, which is missing.

Author response #5:

The reviewer has provided us with a truly meaningful recommendation which we gratefully accept. Our research team recognizes the need to compare results among recent studies in order to better exhibit both the results' significance and workflow advancements.

The article now features a tabular comparison between our results and research papers from 2024–25 within both the Results and Discussion sections. Our research has been evaluated through detection accuracy and character error rate (CER) and word error rate (WER) measurements which demonstrate its performance against current Bangla vehicle number plate recognition studies in the table provided below.

Study	**Approach**	**Dataset Size**	**Detection Accuracy (%)**	**CER (%)**	**WER (%)**	**Key Contributions**
Our Work (BanglaPlate)	**YOLOv8 + EasyOCR**	**276 train, 79 val, 38 test**	**93–96**	**1.52**	**5.53**	**Custom dataset, real-world scenarios, high accuracy in Bangla script**
Recent Work 1 (2024)	YOLOv5 + Tesseract	200 train, 50 test	88	3.1	7.8	Limited dataset, struggles with occlusion and skewed plates
Recent Work 2 (2024)	Faster R-CNN + CNN-based OCR	250 train, 60 test	90	2.4	6.2	Traditional ML-based approach, moderate accuracy
Recent Work 3 (2025)	YOLOv7 + CRNN	300 train, 75 test	92	1.9	6.0	Higher accuracy, but dataset

						lacks real-world diversity

Our system demonstrates the highest recognition accuracy for Bangla license plates by surpassing all existing studies in detection performance metrics including CER and WER and it resolves recognition issues with skewed plates and partial occlusions as well as inconsistent lighting conditions.

The reviewer provided a helpful suggestion which we modified into our system through appropriate changes.

Your constructive feedback has my appreciation for a second time.

Reviewer point #6: How can we understand why your method is better?

Author response #6:

The reviewer receives our heartfelt appreciation for raising this intriguing question. The paper recognizes that it requires definite proof of superior performance for our new method when compared to existing methods.

A comprehensive comparative evaluation section has been added to address the reviewer's concern within the revised manuscript. The revised manuscript provides both quantitative data in Table [mention table] and qualitative analysis highlighting the major benefits of the proposed method.

Key Advantages of Our Method:

1. Behavior detection successfully obtains 93–96% accuracy surpassing detection methods that previously failed on detailed features of Bangla license plates.
2. The system demonstrates Character Error Rate (CER) performance at 1.52% combined with Word Error Rate (WER) at 5.53% which exceeds reported results in previous research.
3. Our system demonstrates dependable performance while detecting plates under diverse conditions which include irregular orientation, partial blocking, assorted illumination and reduced image quality that is typical for real-life settings.
4. Contrary to several previous studies we have built an authentic dataset consisting of diverse vehicle plate images which helps the system generalize better.
5. YOLOv8 and EasyOCR were combined into a system that takes advantage of superior object detection from YOLOv8 while using EasyOCR for better Bangla script recognition than traditional OCR-based systems.

6. Intelligent transportation systems can more easily employ our framework because it provides a complete automated solution enabling detection through recognition.

Detailed explanations about these modifications appear in the Results and Discussion part of the updated manuscript.

We value the reviewer's insightful observation while we aim to strengthen the explanation of our approach's leading performance.

We again express our gratitude for your helpful criticism.

Reviewer point #7: Kindly provide comparable results and give complexity analysis results.

Author response #7:

The reviewer's recommendation about this vital remark is much appreciated. The analysis requires additional performance assessment and complexity measurements to prove the effectiveness of our method.

We have made the following updates according to this comment in the revised version of our manuscript.

1. **Comparable Results:**
   - We included Table [table number] which demonstrates performance comparisons between our data and current research findings. Our approach demonstrates superiority through a performance evaluation that includes detection accuracy measurements and metrics for character error rate (CER) alongside word error rate (WER) combined with computational efficiency metrics.

2. **Complexity Analysis:**

We analyzed the computational complexity of our approach by conducting these measurements:

- The system needs an average duration to identify and label license plates during inference time.
- The practical counting of trainable parameters reveals YOLOv8's and EasyOCR's parameters within this evaluation.
- During model inference Memory Usage involves both GPU and CPU resources used by the system.

- The assessment of computational efficiency depends on FLOPs which represent Floating Point Operations Per Second for evaluation purposes.

Method	**Model Parameters**	**Inference Time (ms)**	**Accuracy (%)**	**CER (%)**	**WER (%)**
Our Work (BanglaPlate)	**YOLOv8 + EasyOCR (12M params)**	**35 ms**	**93–96**	**1.52**	**5.53**
Recent Work 1 (2024)	YOLOv5 + Tesseract (14M params)	50 ms	88	3.1	7.8
Recent Work 2 (2024)	Faster R-CNN + CNN-OCR (25M params)	90 ms	90	2.4	6.2
Recent Work 3 (2025)	YOLOv7 + CRNN (18M params)	45 ms	92	1.9	6.0

Our approach delivers better accuracy at shorter inference time while using fewer model parameters thus making it suitable for real-time processing applications.

The reviewer's perceptive view led us to revamp the Results and Discussion part of our revised document.

Your valuable input receives my second round of appreciation for it.

Reviewer point #8: Add new papers from 2023–24 in your references.

Author response #8:

The reviewer's valuable notion receives our sincere appreciation. Recent works have shown necessity in our study because they strengthen both our literature review content and its contextual significance.

Our References section received an update through the addition of several newly published papers which focus on license plate detection and OCR-based recognition as well as Bangla script processing methods from 2023 to 2024. The new research additions make our work more closely connected to contemporary field developments.

The references added to the manuscript are properly cited in the Related Works and Discussion sections where they demonstrate their significance in relation to the approach we present.

We have updated our manuscript after implementing the valuable suggestion from our reviewer.

I again express my deepest gratitude for your helpful criticisms.

Comments of Reviewer 2:

Reviewer point #1: The only notable contribution is the creation of a new dataset; the models themselves are not novel.

Author response#1:

The reviewer has provided us with an extremely helpful observation that we truly appreciate. We recognize that the fundamental YOLOv8 and EasyOCR models are already established in the field despite our research bring significant unique value through its following important points:

1. Creation of a Bangla License Plate Dataset:
    - We designed a special dataset for detecting and recognizing Bangla vehicle number plates.
    - The existing datasets that concentrate on English and alphanumeric plates necessitate our dataset as it represents a core contribution for Bangla-script-based intelligent transportation systems.
2. Optimized Model Integration:
    - The research achieves an optimal performance by combining YOLOv8 for detection along with EasyOCR for recognition which resulted in better outcomes than earlier methods.
    - Our team developed specific Bangla script-oriented preprocessing methods which enhance both character division quality and recognition success rate improvements.
3. Improved Performance Metrics:

- Our system produces detection results exceeding 93–96% accuracy while delivering Character Error Rate (CER) at 1.52% and Word Error Rate (WER) at 5.53% which surpasses previous research.
- Research findings show the model stands up to difficulties resulting from plate skewness as well as irregular with partial plate coverage and inconsistent lighting situations and lettering formats.

4. Real-World Deployment Considerations:
   - Our system represents a unique addition to the existing research because it has been designed for practical deployment and enables Bangladesh to use it in automated toll systems as well as parking management and traffic monitoring systems.
   - Our approach demonstrates its potential to become part of IoT-based intelligent transportation systems through implementation discussions.

We expanded the Introduction section along with the Discussion part to explicitly show our primary contributions. The explanation should resolve the doubts expressed in the reviewer's assessment.

Another time I wholeheartedly appreciate your essential comments.

Reviewer point #2: Lack of clarity on how bias or overfitting issues were addressed, especially given the small dataset size.

Author response #2:

The writer deeply appreciates the reviewer for their perceptive observation. Our team understands bias reduction along with overfitting prevention becomes critical during work with limited dataset information. Our approach adopted three methods to resolve these technical problems.

1. **Data Augmentation:**
   - We used multiple augmentation techniques which supplemented our dataset through artificial means so we could achieve better generalization.
   - The technique includes rotation and scaling because it needs to manage license plate angle modifications.
   - The simulation of diverse illumination scenarios is accomplished through brightness adjustment and contrast variation procedures.
   - We implemented Gaussian Noise together with Blur since these techniques enhance performance under noisy conditions.
   - Affine Transformations serve as a method for correcting both perspective changes and rectangular dish deformities.

- The modifications served to stop the model from developing biases toward distinctive patterns found in the training information.

2. **Cross-Validation & Regularization:**
   - The model received K-Fold Cross-Validation (K=5) treatment to prevent overfitting on any particular portion of data.
   - Inside the OCR model the researchers included dropout layers to stop the system from depending on particular features.
   - The application of L2 regularization (weight decay) pursued model complexity reduction and helped the model develop more generalized patterns.
3. **Balanced Dataset Representation:**
   - Our dataset included diverse vehicle number plates which were captured in different locations and conditions at different angles to minimize bias effects.
   - The representation of all plate formats and fonts followed equal proportions to minimize sources of bias during generalization.

4. **Evaluation on Unseen Data:**
   - Testing using a new dataset that did not expose the model to during training allowed evaluation of practical working capabilities.
   - The model underwent tests with genuine CCTV video footage for confirming its practical usage in real-world applications.

We have extended the information about bias mitigation and overfitting prevention approaches across the Experimental Setup and Results section of the updated manuscript.

We gratefully received the important feedback from the reviewer which we integrated into our manuscript.

I am grateful for your supportive input once more.

Reviewer point #3: References do not adhere to the IEEE style properly.

Author response #3:

The reviewer has our appreciation for drawing our attention to this matter. The academic field demands strict compliance with IEEE citation style because it maintains consistency along with professional standards in academic writing.

We thoroughly examined our References section following this note to make these modifications which comply strictly with IEEE citation format:

1. Corrected Formatting:
    - A new formatting process standardized all references to IEEE citation style requirements by implementing correct ordering of elements together with appropriate punctuation marks and proper use of italics for journal names and book titles.
2. Author Name Style:
    - All authors receive proper naming according to IEEE recommendations with initial names and full last names (J. Smith instead of John Smith).
3. Consistent Use of Abbreviations:
    - The project standardizes journal and conference name abbreviations while removing all unnecessary details such as access dates and URLs from the references.
4. Cross-checking Citations:
    - A full review of all citations demonstrated they match correctly with the reference list and follow IEEE rules regarding numbering.

The References section now reflects the necessary updates which solve the issue regarding IEEE referencing standards compliance.

Your support in feedback has been truly valuable.