Byakaron

Bangla Grammar & Spell Checker

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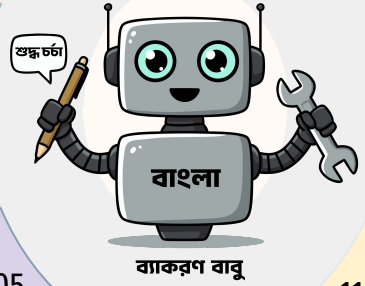

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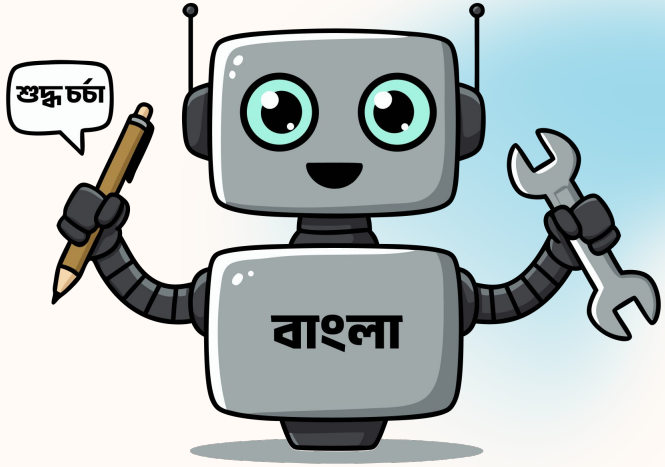
01

Introduction

1. Overview
2. Problem Statement



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Overview

Definition and Purpose

Importance of Grammar Checking

Brief History of Bengali Language Processing

Features of Byakaron

- Grammar Checking
- Spell Checking
- Cross Platform

Problem Statement

Problem Statement

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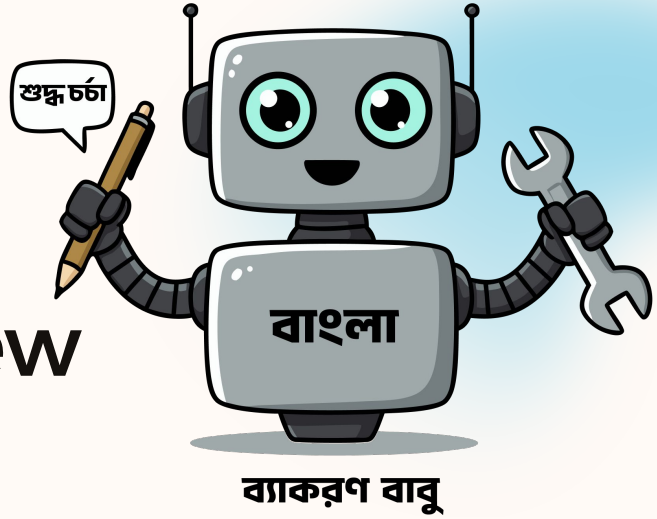
Bangla Grammar & Spell Checker

02



Motivation & Literature Review

1. Motivation
2. Critical Analysis of the Related Works

Motivation

Enhancing Communication

Byakaron improves Bangla writing by enhancing grammar, spelling, and clarity.

Supporting Language Learning

Byakaron aids Bangla learning with instant feedback, boosting user confidence, practice, and language proficiency.

Increasing Accessibility

Byakaron boosts access to Bangla grammar tools, helping users improve writing skills and confidence.

Critical Analysis of the Related Works(1/2)

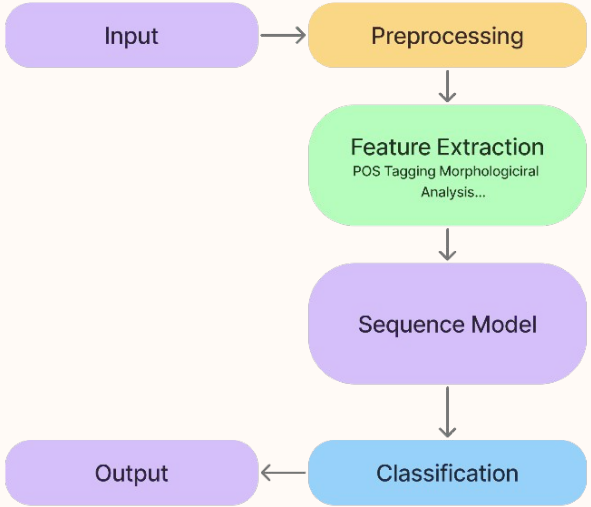


Figure 1: Workflow for rule-based or traditional method

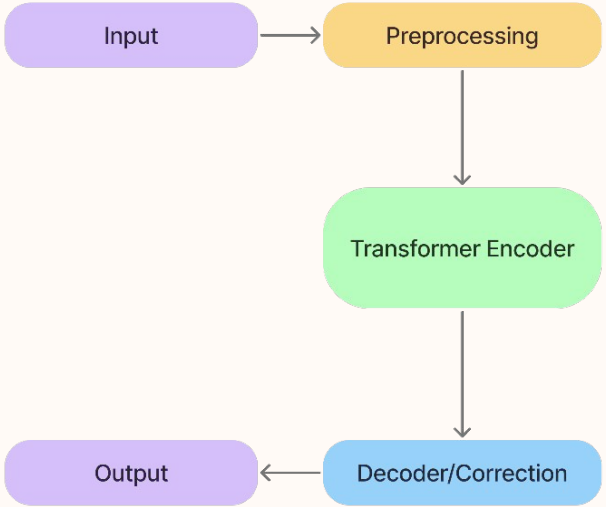


Figure 2: Transformer only pipeline

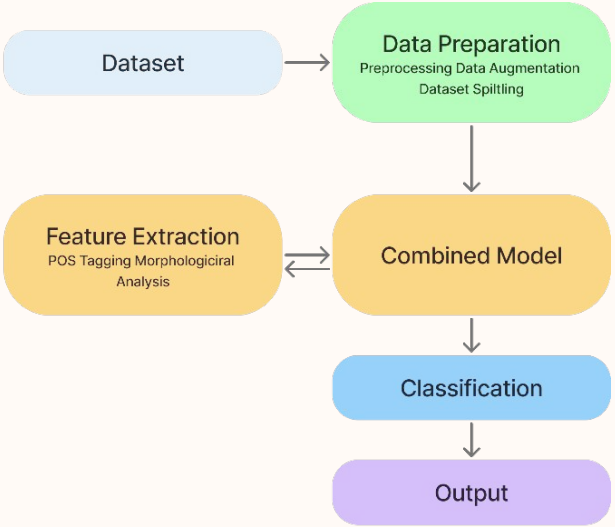


Figure 3: Workflow for hybrid neural network

Critical Analysis of the Related Works(2/2)

Table2: Some Research Papers Overview

Authors	Dataset	Contribution	Limitations
Bhattacharyya & Bhattacharya [3]	VAIYAKARANA Dataset	First standardized benchmark for Bangla grammar correction; evaluation framework	Limited coverage; lacks linguistic diversity; no real-time testing
Akter & Rahman [4]	Bangla Wikipedia + News Datasets	Comparative evaluation of BERT, T5, GPT-2 for Bangla grammar error detection	Does not address real-time performance; domain shifts not evaluated
Saha & Dey [5]	Custom Bangla Grammar Dataset	Fine-tuned BERT & T5 models showing improved accuracy in Bangla grammar correction	Limited dataset availability affects generalization
Islam & Kabir [6]	Large Bangla Text Dataset	Evaluation of BERT and T5 for sentence-level Bangla grammar correction	High computational cost; requires extensive resources for pre-training/fine-tuning

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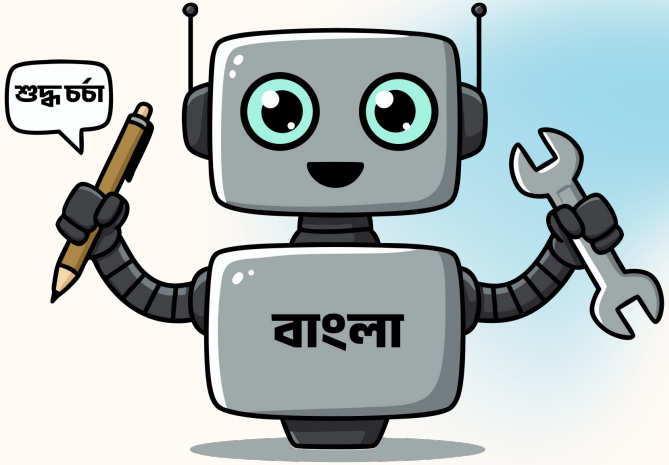

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Objectives & Methodology

1. Objectives
2. Proposed Methodology

Objectives

Specific Goals

- Accurate Bangla Spell Checking
- Grammar Error Detection
- User-Friendly Interface

Long-term Vision

- Contextual Suggestions and Style Improvements
- Bangla Language Ecosystem Integration
- AI-Powered Grammar Learning

Proposed Methodology (1/4)

Qualitative vs Quantitative Methods → Data Collection Techniques → Analysis Strategies

Byakaron uses surveys and analytics to guide updates, ensuring it meets user needs and improves over time.

User Feedback Integration

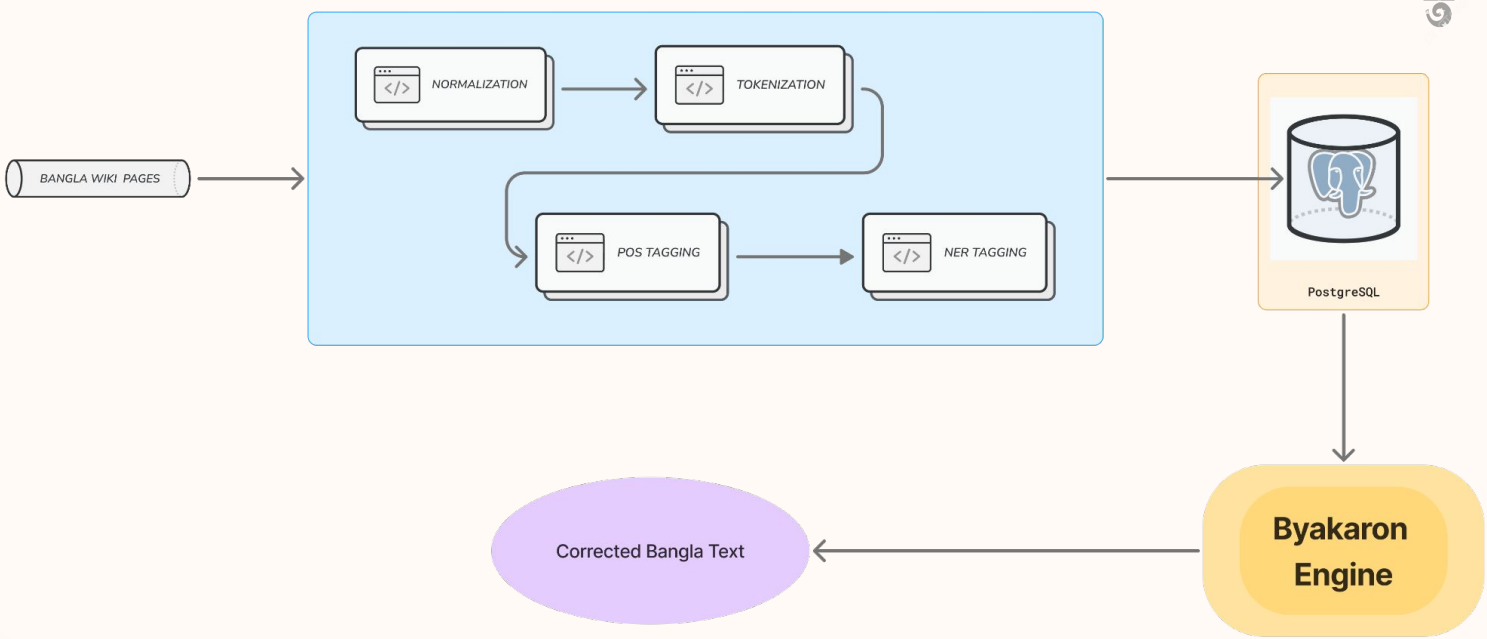
Development Cycle

Byakaron follows an iterative cycle of build, test, deploy, and refine based on user feedback.

Evaluation Metrics

Byakaron is evaluated via precision, recall, F1 score, and refined through user feedback and error analysis.

Proposed Methodology (Architecture)(2/4)



Proposed Methodology (Architecture)(3/4)

NORMALIZATION

<h1>আমি ভাত [2] খাই<h1>

↓

আমি ভাত খাই

TOKENIZATION

আমি ভাত খাই

↓

- আমি
- ভাত
- খাই

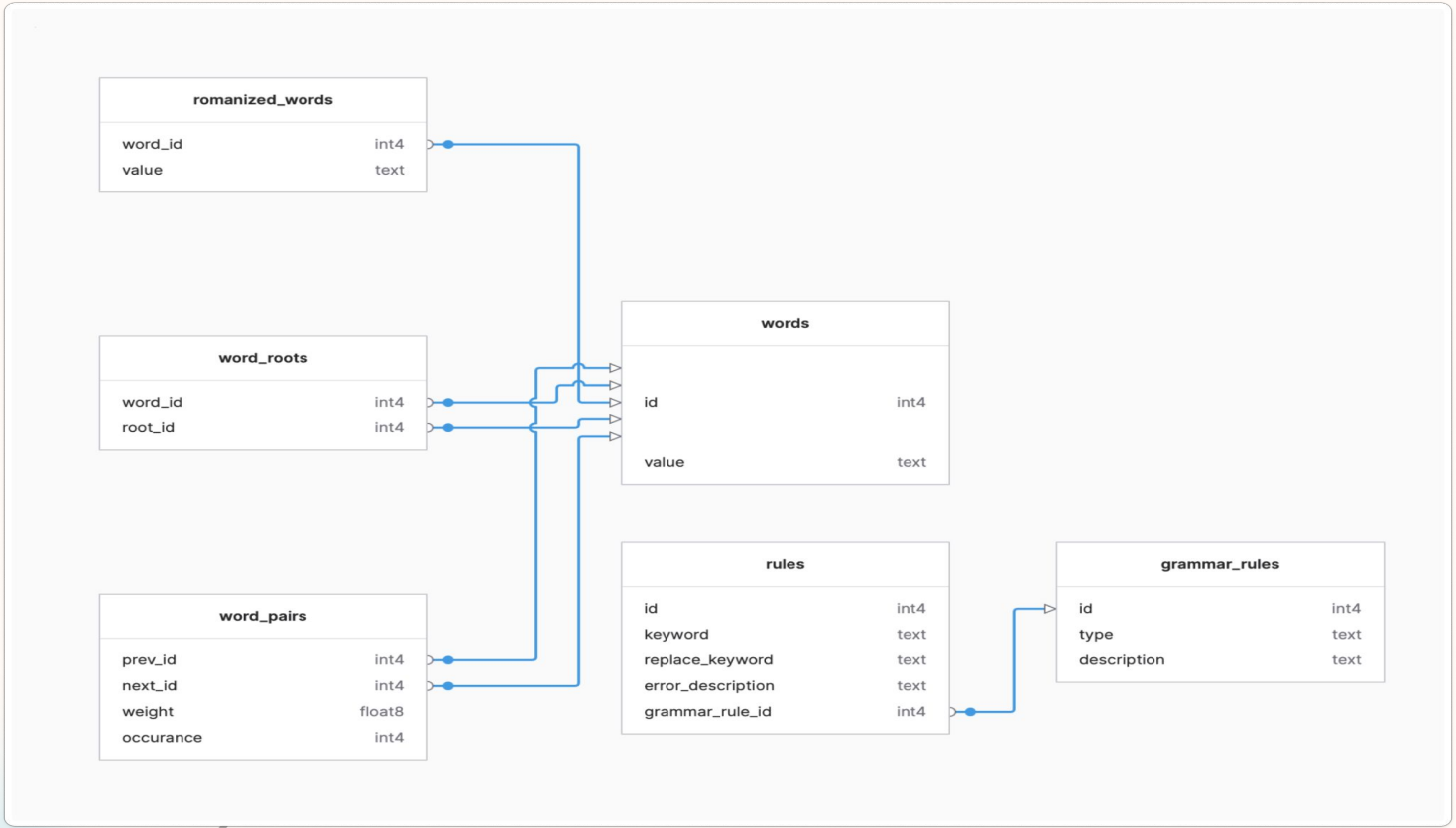
POS TAGGING

- আমি
- ভাত
- খাই

→

- আমি - SUB
- ভাত - OBJ
- খাই - VERB

Proposed Methodology (ER Diagram)(1/4)



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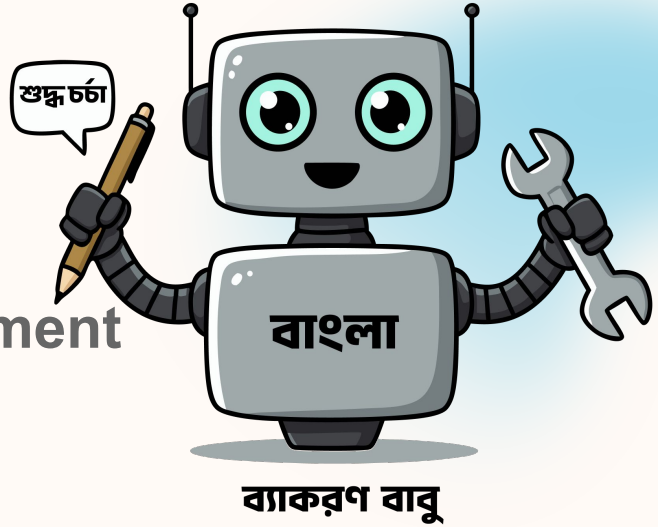
Result Analysis

1. Functional and Non-Functional Requirement
2. SDLC Model Selection
3. Frontend Design
4. Output



Function and Non-Functional Requirement

Functional Requirements

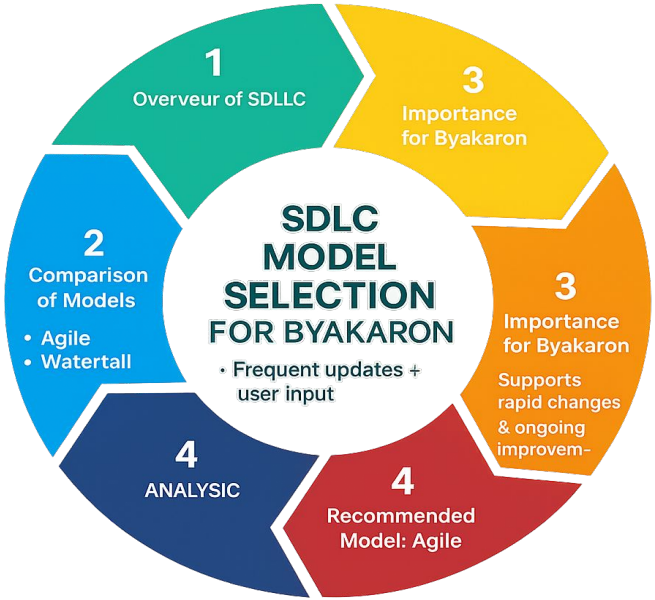
- Bangla Grammar & Spell Checking
- Real-time Suggestions
- Multiple Writing Modes
- Interactive Editing
- Custom Dictionary Support
- Export Corrected Text

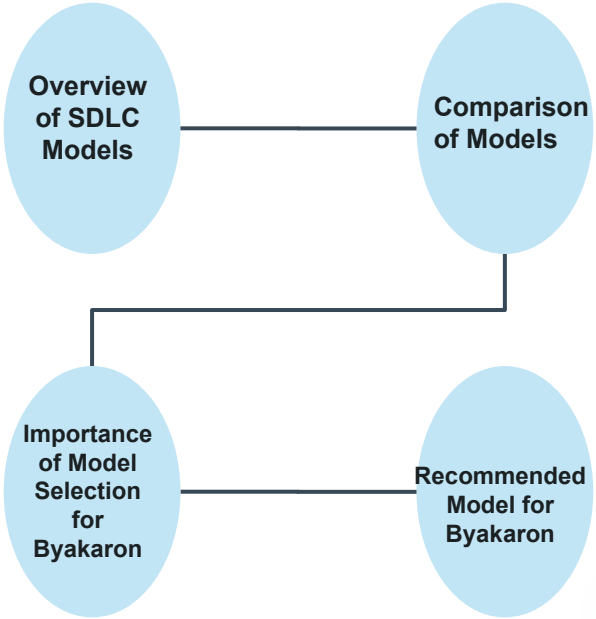
Non-Functional Requirements

- Scalability
- High Performance
- High Availability
- User-Friendly Interface
- Security & Privacy
- Cross-Platform Compatibility

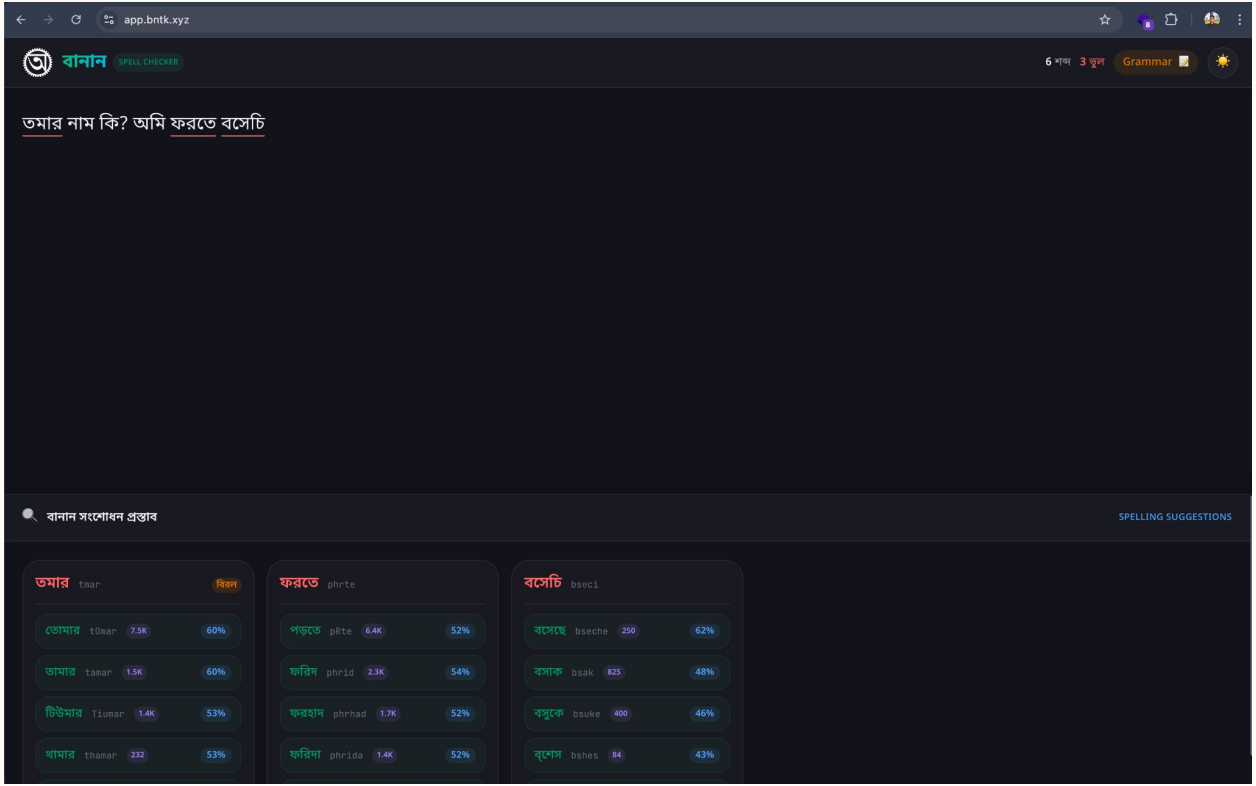
SDLC Model Selection with Diagram

94.5%	128	97	31	14	13	92%
Overall completion rate	Total number of tasks	Completed task	In progress task	Key task	Complete key task	Key task Completion rate

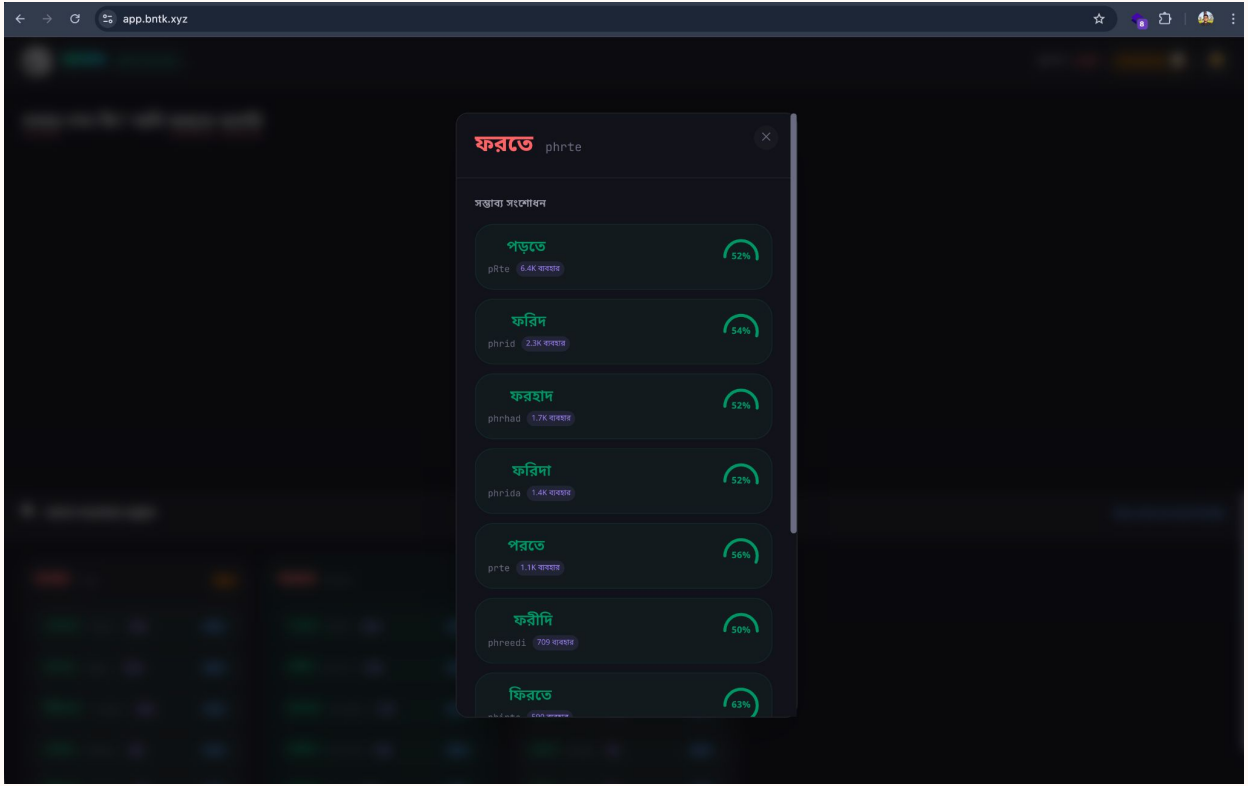




Output


app.bntk.xyz
বানান
SPELL CHECKER
6 শব্দ 3 ভুল
Grammar
তমার নাম কি? অমি ফরতে বসেচি
বানান সংশোধন প্রস্তাব
SPELLING SUGGESTIONS
তমার tmar বিরল
তোমার t0mar 7.5K 60%
তামার tamar 1.5K 60%
টিউমার Tiumar 1.4K 53%
থামার thamar 232 53%
ফরতে phrte
পড়তে pRte 6.4K 52%
ফরিদ phrid 2.3K 54%
ফরহাদ phrhad 1.7K 52%
ফরিদা phrida 1.4K 52%
বসেচি bseci
বসেছে bseche 250 62%
বসাক bsak 825 48%
বসুকে bsuke 400 46%
ব্শেস bshes 84 43%

Output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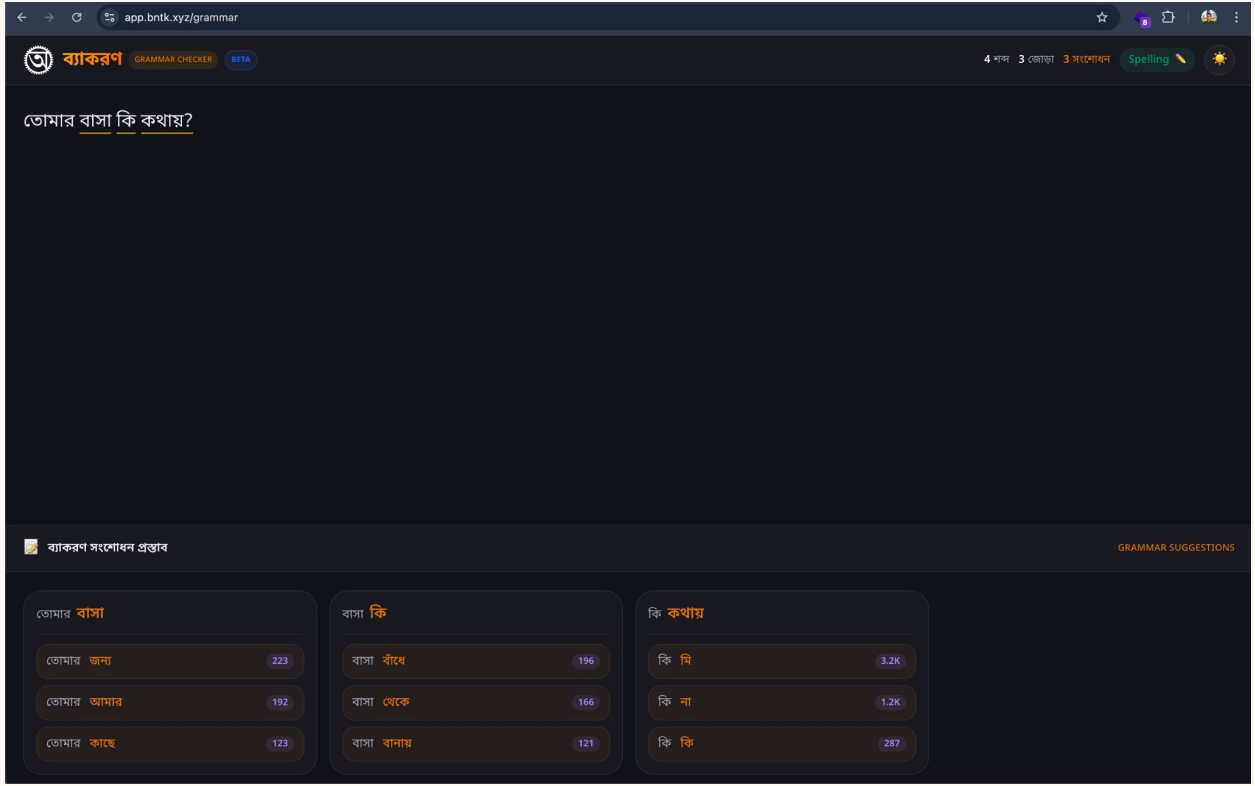
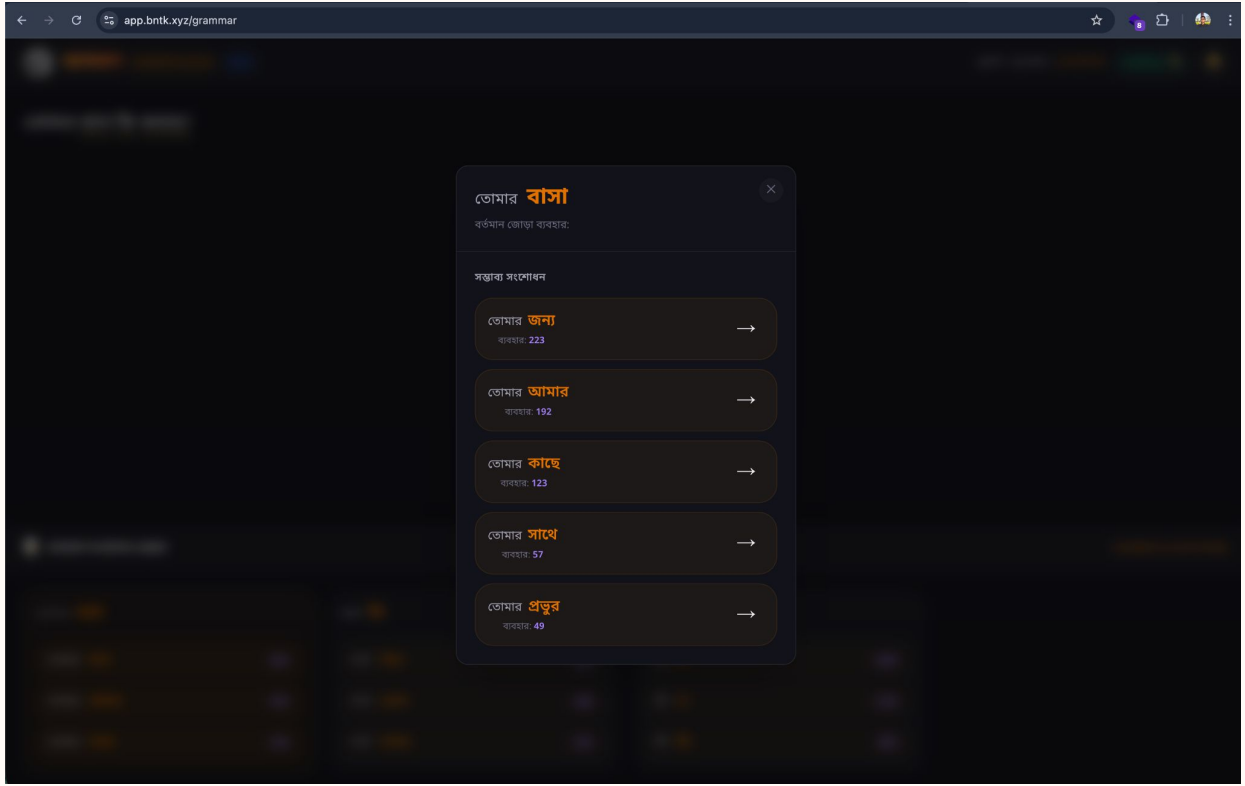
ফরতে phrte
সম্ভাব্য সংশোধন
পড়তে
pRte 6.4K ব্যবহার
52%
ফরিদ
phrid 2.3K ব্যবহার
54%
ফরহাদ
phrhad 1.7K ব্যবহার
52%
ফরিদা
phrida 1.4K ব্যবহার
52%
পরতে
prte 1.1K ব্যবহার
56%
ফরীদি
phreedi 709 ব্যবহার
50%
ফিরতে
63%

Output


app.bntk.xyz/grammar
ব্যাকরণ
GRAMMAR CHECKER
BETA
4 শব্দ 3 জোড়া 3 সংশোধন
Spelling
তোমার বাসা কি কথায়?
ব্যাকরণ সংশোধন প্রস্তাব
GRAMMAR SUGGESTIONS
তোমার বাসা
তোমার জন্য 223
তোমার আমার 192
তোমার কাছে 123
বাসা কি
বাসা বাঁধে 196
বাসা থেকে 166
বাসা বানায় 121
কি কথায়
কি মি 3.2K
কি না 1.2K
কি কি 287

Output


app.bntk.xyz/grammar
তোমার বাসা
বর্তমান জোড়া ব্যবহার:
সম্ভাব্য সংশোধন
তোমার জন্য
ব্যবহার: 223
তোমার আমার
ব্যবহার: 192
তোমার কাছে
ব্যবহার: 123
তোমার সাথে
ব্যবহার: 57
তোমার প্রভুর
ব্যবহার: 49

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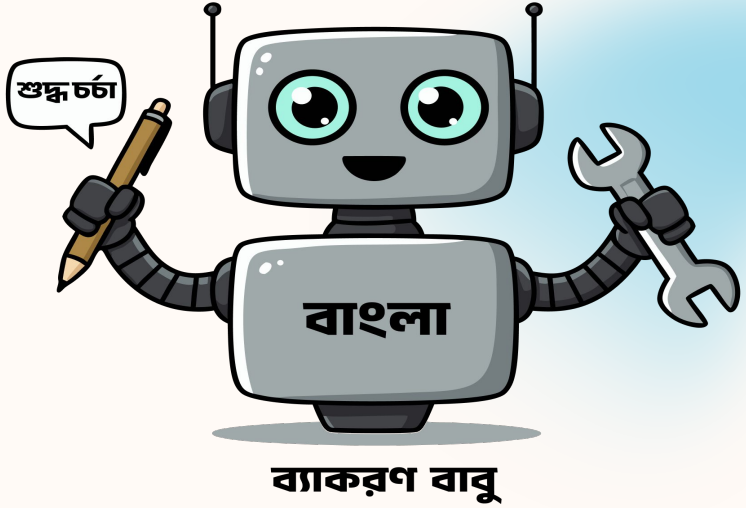
05



Discussion

1. Contribution
2. Limitation

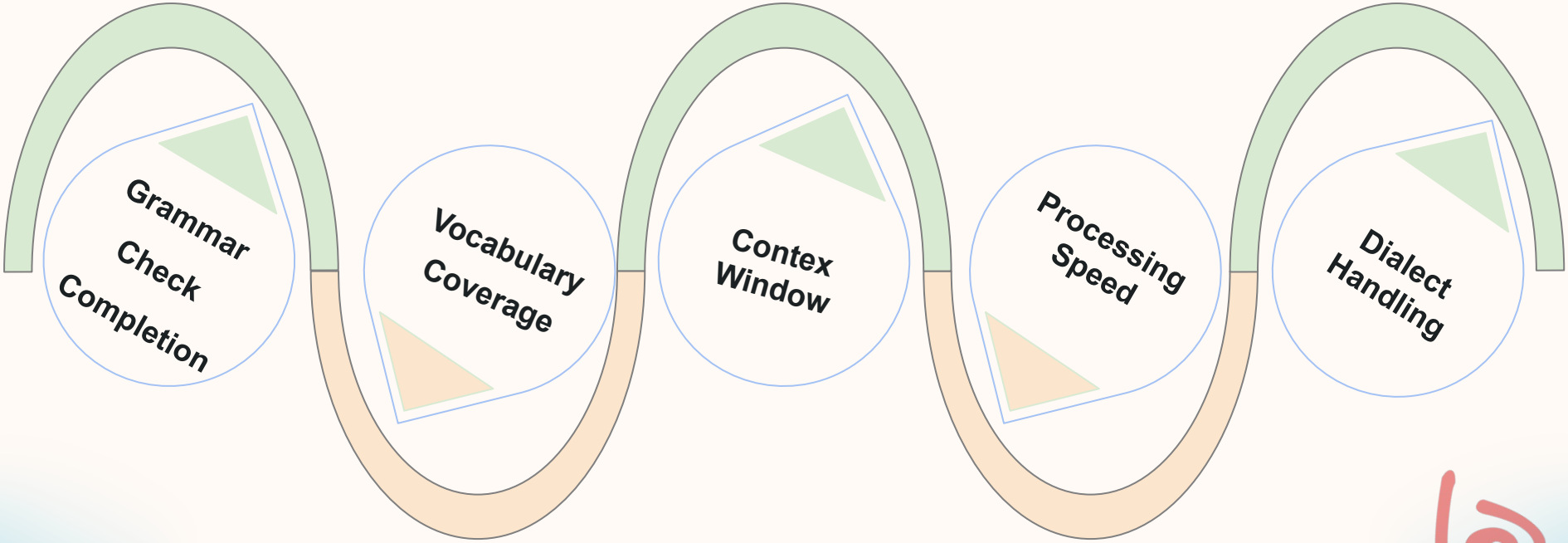
Contribution

Nurul Huda: Responsible for backend system development and core functionality.

Jubaer Al Mamun: Worked on frontend development and interface design.

Md. Mursaline Parvez: Prepared project documentation, reports, and presentation materials.

Limitatons


Grammar Check Completion
Vocabulary Coverage
Contex Window
Processing Speed
Dialect Handling

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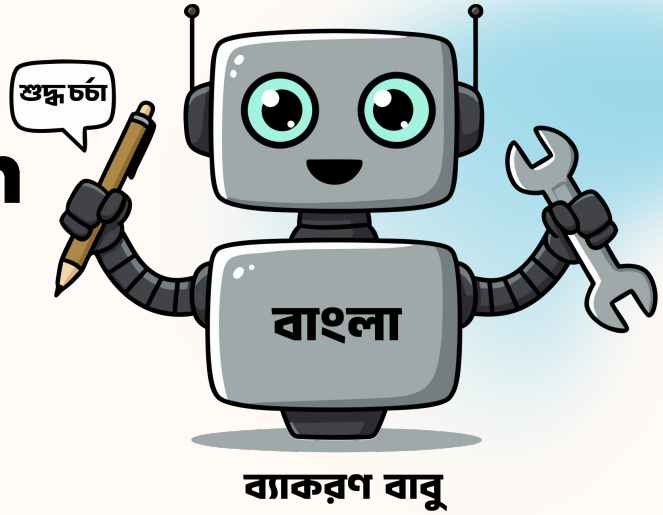
06

Future Activity & Conclusion



1. Future Activity
2. Conclusion
3. References
4. Questions and Answers

Future Activity

ক খ গ ঘ ঙ
চ ছ জ ঝ ঞ
ট ঠ ড ঢ ণ
ত থ দ ধ ন

01

Grammar Checker Enhancement

03

Dataset Expansion

05

Advanced Features

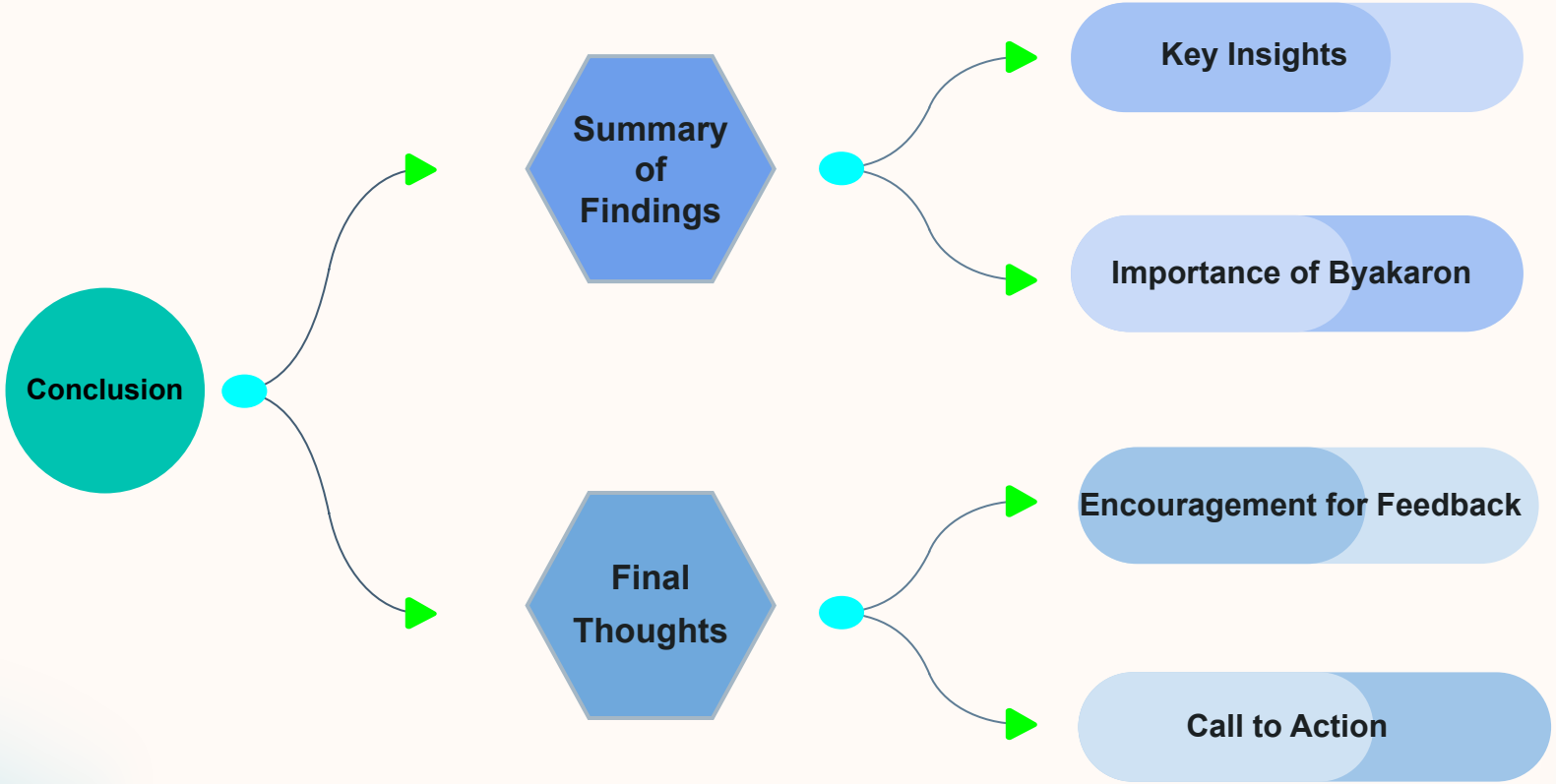
02

Model Improcements

04

Platform Extensions

Conclusion


Conclusion
Summary of Findings
Key Insights
Importance of Byakaron
Final Thoughts
Encouragement for Feedback
Call to Action

References

1. https://dumps.wikimedia.org/bnwiki - Primary data source.
2. https://openbangla.github.io/ - Existing open source tools.
3. Bhattacharyya, P., & Bhattacharya, A. (2024). VAIYAKARANA: A Benchmark for Automatic Grammar Correction in Bangla. https://www.researchgate.net/publication/381580191_VAIYAKARANA_A_Benchmark_for_Automatic_Grammar_Correction_in_Bangla
4. Akter, A., & Rahman, M. (2023). Comparative Study of Transformer Models for Bangla Grammar Error Detection. https://arxiv.org/abs/2211.03730
5. Saha, S., & Dey, P. (2023). Bangla Grammar Error Correction Using Fine-tuned Language Models. https://www.academia.edu/9886588/NLG_Approach_for_Bangla_Grammatical_Error_Correction
6. Islam, R., & Kabir, M. (2023). Bangla Sentence Correction Using BERT and T5 Models. https://aclanthology.org/2023.banglalp-1.14.pdf

Any Questions

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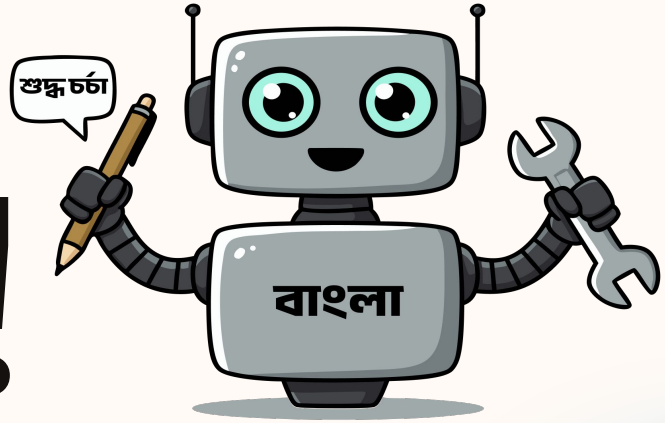
Thanks!



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