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contextual accuracy. This paper highlights the project's methodology, results, and future potential.

Python for the backend, the app focuses on mixed-language inputs while maintaining fluency and

mobile application that translates between English, Sinhala, and Tamil. Utilizing Flutter for the frontend and

The "Dual Language Translator" project addresses these challenges by providing an intuitive, cross-platform

communication in multilingual societies.

particularly for underrepresented languages like Sinhala and Tamil. These gaps create barriers to effective

regions. Existing translation tools often fail to handle real-time, mixed-language inputs effectively,

Globalization has transformed how individuals communicate across languages, particularly in multilingual

1 INTRODUCTION

KEYWORDS: Bilingual Translation, Flutter, Natural Language Processing, Sinhala, Tamil

a critical need in underrepresented language research.

computational linguistics by providing an effective tool for real-time multilingual communication, addressing

capabilities, and integrating voice-to-text features to broaden accessibility. This project contributes to

complex sentence structures. Future work will focus on expanding language support, adding offline

app demonstrates robust functionality, limitations remain in translating idiomatic expressions and certain

score of 0.85, high user satisfaction ratings, and a translation response time averaging 1.5 seconds. While the

and starred translations enhance usability and user engagement. Testing results reveal an average BLEU

inputs and maintaining contextual and idiomatic relevance. Features like language selection, history viewing,

application addresses significant challenges in machine translation, including handling code-switched

structures of the target languages, such as the subject-object-verb (SOV) order in Sinhala and Tamil. The

Transformer models, to achieve high translation accuracy while respecting the grammatical and syntactic

multilingual regions. The app incorporates Neural Machine Translation (NMT) techniques, particularly

for the backend, the application supports mixed-language inputs a common communication style in

real-time translation between English, Sinhala, and Tamil. Built using Flutter for the frontend and Python Flask

This paper details the development of a dual-language translation mobile application designed to facilitate

ABSTRACT

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Dual Language Translator

Content Checked For Plagiarism

Speak Time

6 minute(s)

Partial Match

Unique

Read Time

5 minute(s)

2%

Plagiarism

94%

Paragraphs

53

6%

Sentences

68

Exact Match

Characters

6810

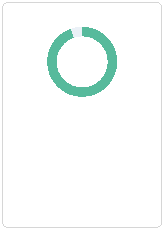
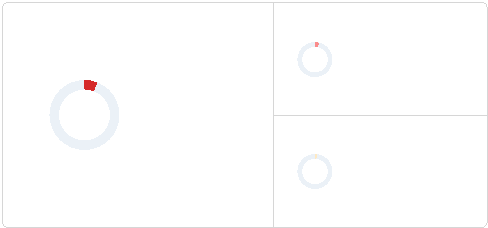
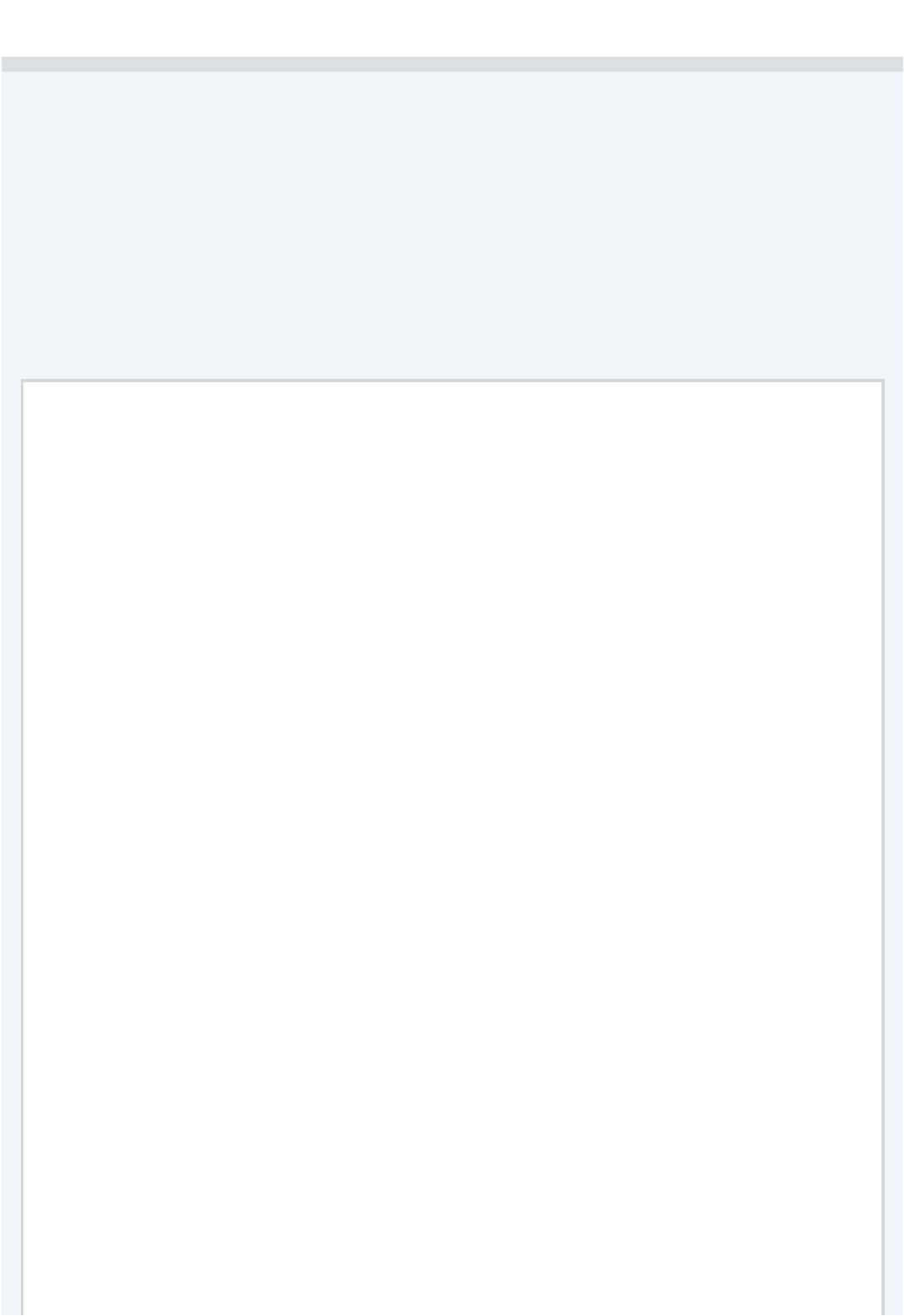
4%

Words

870

Plagiarism Scan Report

Date: 30-11-2024



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occasionally struggled with domain-specific terminology and complex sentence structures. Continued

The application excelled in translating straightforward sentences and commonly used phrases. However, it

Figure 5: English & Sinhala mixed input

- User feedback: Over 90% satisfaction in fluency and grammatical accuracy.

- BLEU Score: 0.85, indicating high similarity to human translations.

4.1 Translation Accuracy

4. RESULTS AND DISCUSSION

results displayed to users almost instantaneously.

The frontend communicates with the backend via RESTful APIs. Translations are processed in real time, with

3.3 Workflow

Figure 4 :Starred Page

Figure 3 : History Page

- MySQL for storing translation history and starred translations.

- Neural Machine Translation using the Hugging Face Transformers library.

- Language detection for mixed-language inputs.

translation process involves:

Flask serves as the backend framework, handling translation requests and managing the database. The

3.2 Backend

.

- History and starred translations for user convenience.

Figure 2: Drop down Menu

- Dropdown menus for selecting input and target languages.

Figure 1:UI of dual translator app

- Dual-language input support with real- time text handling.

Key features include:

Flutter is used for the mobile app's interface, ensuringcross - platform compatibility.

3.1 Frontend

stack includes:

The application employs a user-centered design and an iterative development approach. The technology

3 .methodology

handling mixed-language inputs remain limited.

scalable and efficient backend processing. Despite advancements, mobile translation apps capable of

development with responsive user interfaces, while Python, paired with frameworks like Flask, supports

Mobile-based MT tools have gained popularity for their accessibility. Flutter enables cross-platform

limited annotated datasets and their unique syntactic structures.

issues in this domain. Low-resource languages, such as Sinhala and Tamil, pose additional difficulties due to

for traditional MT systems. Identifying language boundaries and preserving contextual accuracy are critical

Code-switching, or mixed-language input, is common in multilingual communities but presents challenges

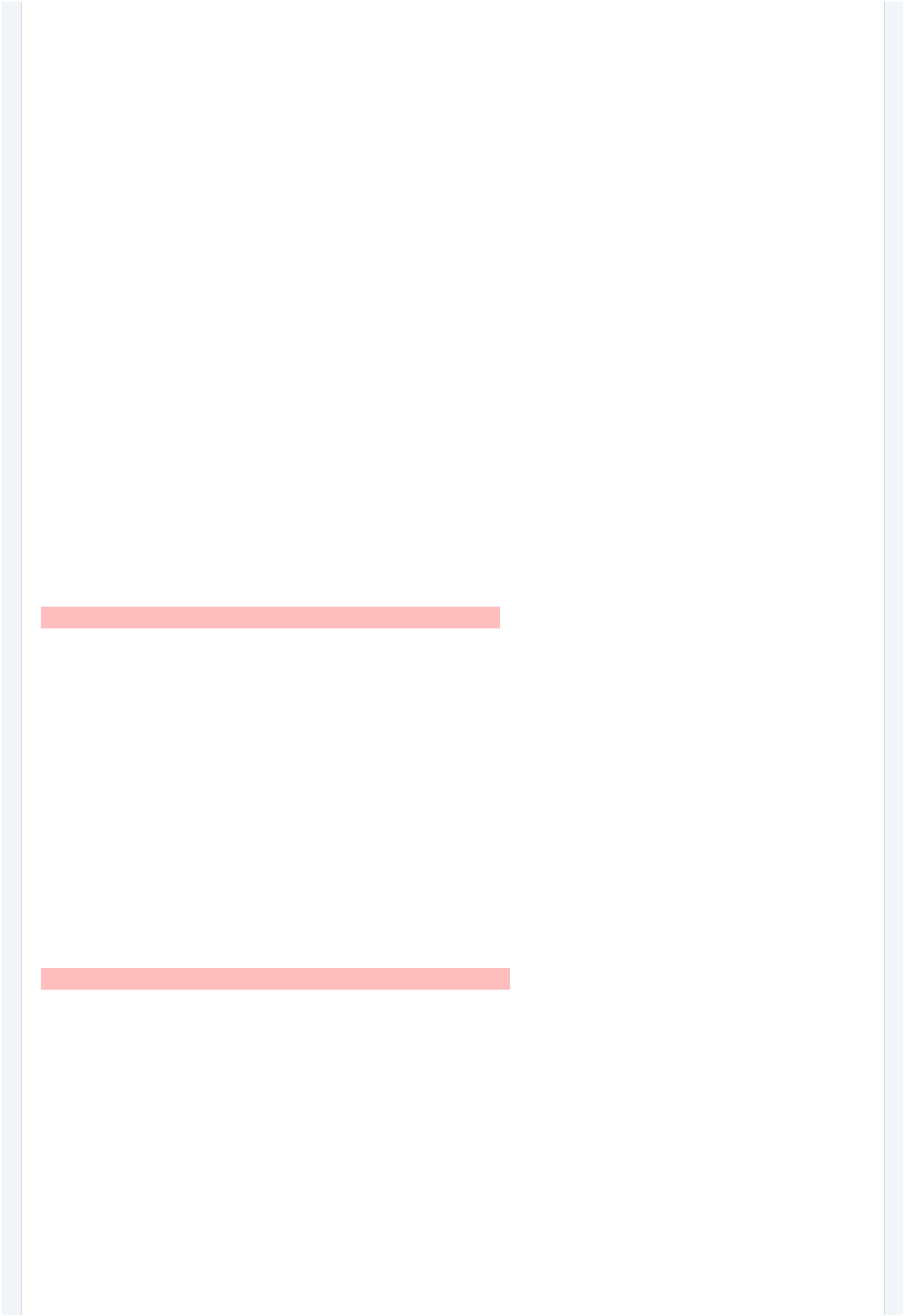
translation quality, particularly for context-sensitive inputs.

Models like Transformers, introduced by Vaswani et al. (2017), utilize self-attention mechanisms to improve

(NMT). NMT leverages neural networks to process complex syntax and idiomatic expressions effectively.

Machine Translation (MT) has evolved significantly, from rule-based systems to Neural Machine Translation

2 LITERATURE REVIEW



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https://www.designgurus.io/answers/detail/what-is-a-system-design

these requests by interacting with the database and ...

System Operations: The frontend communicates with the backend via RESTful APIs. The backend processes

Title:What is a system design?

Similarity 3%

https://fas.wyb.ac.lk/cmis-home

(General) Degree and the B.Sc. (Joint Major) Degree programmes which fulfills industry needs.

of Applied Sciences by offering Computing and Information Systems (CMIS) as a major subject for the B.Sc.

The Department of Computing & Information Systems contributes to the academic programme of the Faculty

Title:CMIS - Faculty of Applied Sciences

Similarity 4%

formatting-and-activity-7241179010171351040-Q-WO

https://www.linkedin.com/posts/johan-marc-miango-562a63220\_after-a-few-arduous-project-

clearing translations, and ...

Interactive Features: - Dropdown menus for selecting input and target languages. - Buttons for translating,

Title:Johan-Marc Miango's Post

Similarity 6%

Matched Source

addressing more complex translation challenges.

broaden accessibility. Additionally, enhancing the application's contextual understanding will be key to

expanding language support, integrating offline functionality, and introducing voice-to-text capabilities to

translating idiomatic expressions and certain culturally nuanced phrases. Future improvements will focus on

effectively while maintaining a user-friendly interface. Despite these achievements, limitations remain in

providing accurate and fluent translations for English, Sinhala, and Tamil. It handles mixed-language inputs

The "Dual Language Translator" successfully bridges communication gaps in multilingual environments by

5. CONCLUSION

Figure 7 : English & Tamil mixed input

techniques.

\* Context Handling: Improve understanding of idiomatic expressions through advanced machine learning

\* Speech Recognition: Integrate voice-to-text functionality.

\* Offline Capabilities: Develop lightweight translation models for offline use.

\* Enhanced Language Support: Include additional languages and dialects.

6 FUTURE WORK

Figure 6 :Tamil & Sinhala mixed input

particularly appreciated, though improvements are needed for idiomatic expressions and cultural nuances.

User testing highlighted the app's intuitive design and responsiveness. Mixed- language handling was

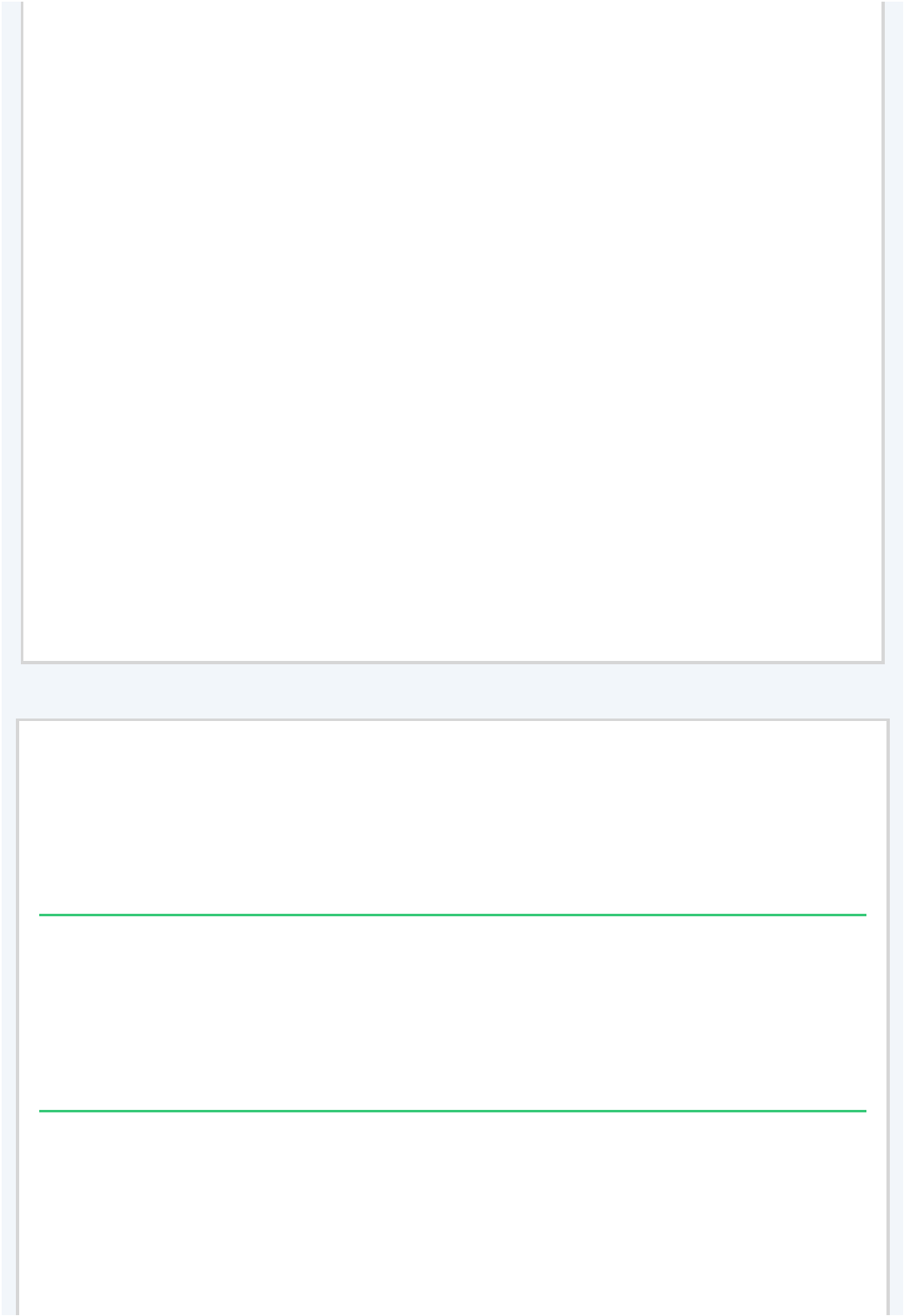
4.3 User Experience

bandwidth scenarios.

- Average translation time: 1.5 seconds under optimal conditions, with a maximum delay of 3 seconds in low

4.2 Response Time

training with diverse datasets could further enhance accuracy and address these shortcomings.



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