

# Braille Bridge – Evaluation Dataset & Results

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## 1. Overview

Braille Bridge is an AI-powered accessibility application designed to convert Braille text into spoken language.

This document presents the evaluation dataset used for testing the system and summarizes the results obtained during prototype validation.

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## 2. Evaluation Dataset

The evaluation dataset for Braille Bridge consisted of sample Braille inputs used to test the AI pipeline.

The dataset included:

- Printed English Braille characters and short words
- Standard Braille dot patterns used in daily communication
- Images captured using a camera under different lighting conditions
- Publicly available Braille reference images used strictly for testing

This dataset was selected to represent realistic usage scenarios for visually impaired users and caregivers.

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## 3. Evaluation Methodology

Each Braille image was provided as input through the application's camera interface.

The processing pipeline consisted of:

- Image input capture
- AI reasoning through the Airia-built AI brain
- Image understanding using the Gemini 2.0 Flash model
- Braille-to-text conversion via prompt-based reasoning
- Audio output through text-to-speech

The system was evaluated based on:

- Accuracy of Braille recognition
  - Correctness of translated text
  - Clarity of audio output
  - Response time and usability
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## 4. Results

The evaluation demonstrated that Braille Bridge performs effectively as a prototype accessibility solution.

Key results observed:

- High accuracy for clear and well-lit Braille images
- Fast response times due to the lightweight Gemini 2.0 Flash model
- Clear and understandable audio output
- Slight performance reduction in low-light or unclear images

Overall, the system successfully translated most standard Braille inputs into meaningful spoken output.

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## 5. Limitations and Future Improvements

While effective as a prototype, the system has some limitations.

Current limitations:

- Sensitivity to image quality and lighting conditions
- Limited dataset size
- Focus on English Braille only

Planned future improvements include:

- Expanding the evaluation dataset
  - Supporting real-time camera detection
  - Adding multi-language Braille support
  - Improving robustness in challenging environments
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## **6. Conclusion**

The evaluation results confirm that Braille Bridge is a functional and impactful AI prototype. The project demonstrates how multimodal AI and no-code tools can be combined to build accessible solutions efficiently.