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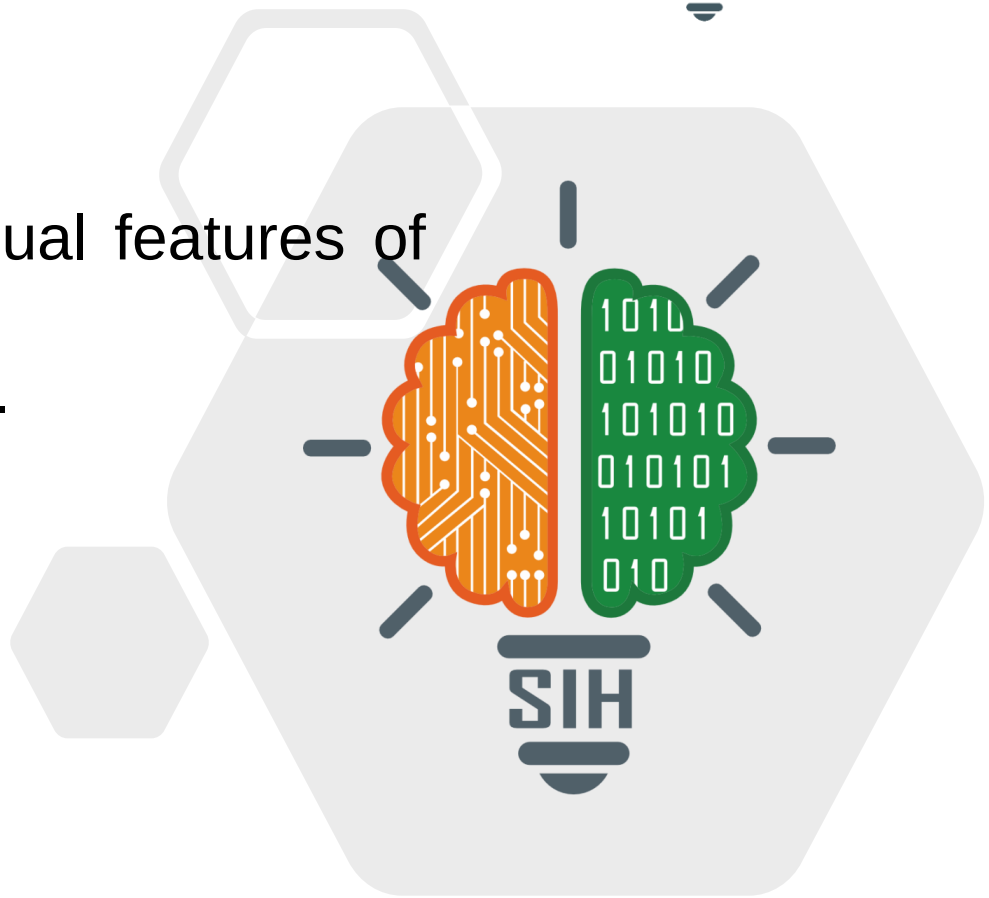
- **Problem Statement ID – 1718**
- **Problem Statement Title-** Capturing Non-manual features of Indian Sign Language and converting It into text.
- **Theme-** Miscellaneous
- **PS Category-** Software
- **Team ID-**
- **Team Name (Registered on portal):** The Game Changers



The Game Changers

Sign Ease-Proposed Solution

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1.Regional Variation Support

Incorporate a comprehensive database of regional sign language variations and non-manual features, allowing the system to recognize and translate diverse sign languages accurately.

2.Multilingual Translation

Enable real-time translation from ASL, BSL, CSL, and ISL into any spoken language, providing users with flexibility in communication across different languages and cultures

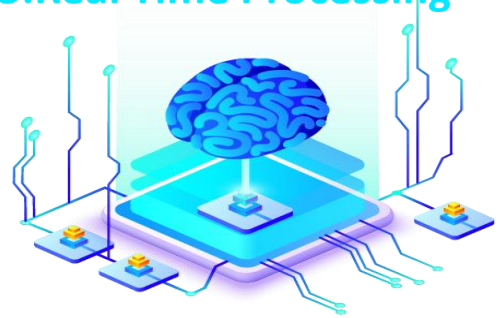
3.Mood Detection

Implement emotion recognition algorithms that analyze facial expressions and body language to detect the user's mood, allowing the translation to include contextual nuances and emotional states

4.User Friendly Interface

Design an intuitive interface that caters to both sign language users and those learning sign languages, making the application accessible to a broader audience.

5.Real Time Processing



Utilize advanced image processing and machine learning techniques to ensure smooth, real-time translation and mood detection in diverse environments.

6.Offline Functionality

Ensure that the system can operate offline, making it usable in various settings without relying on internet connectivity.

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TECHNICAL APPROACH

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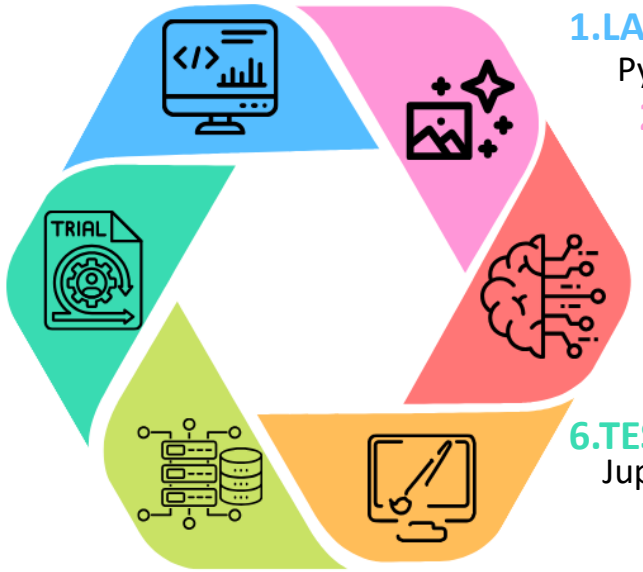
- Technologies to be used



1.LANGUAGES
Python 3,Java,SQL

2.IMAGE PROCCESING
MediaPipe, OpenCV

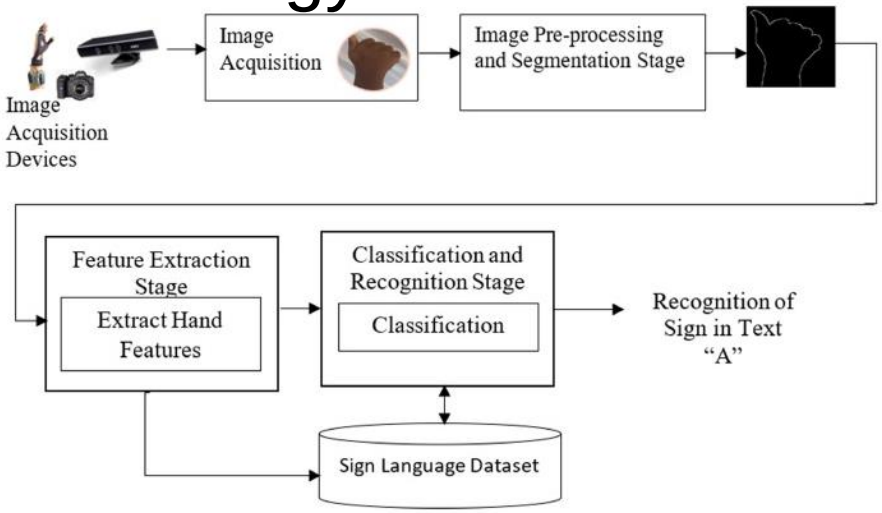
3.MACHINE LEARNING MODELS
Hybrid CNN-RNN,YOLO V8

4.FRONTEND
JavaFX

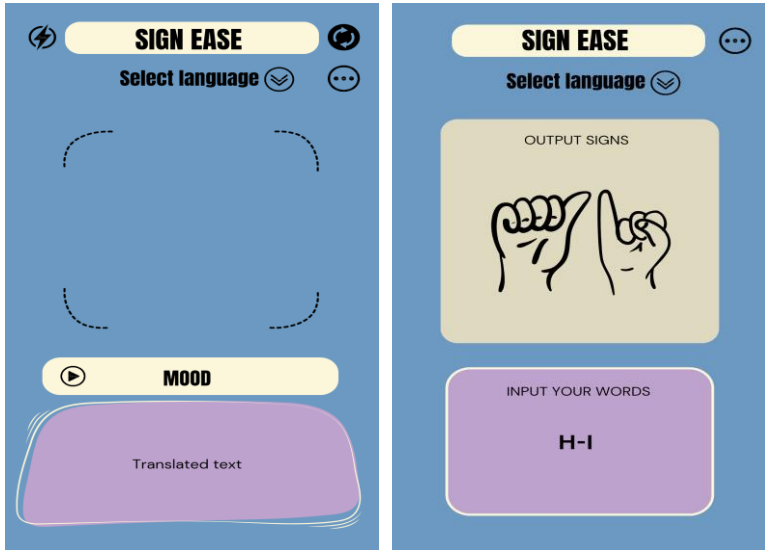
5.DATABASE
MySql

6.TESTING AND PROTOTYPING
Jupyter Notebook,Vscode

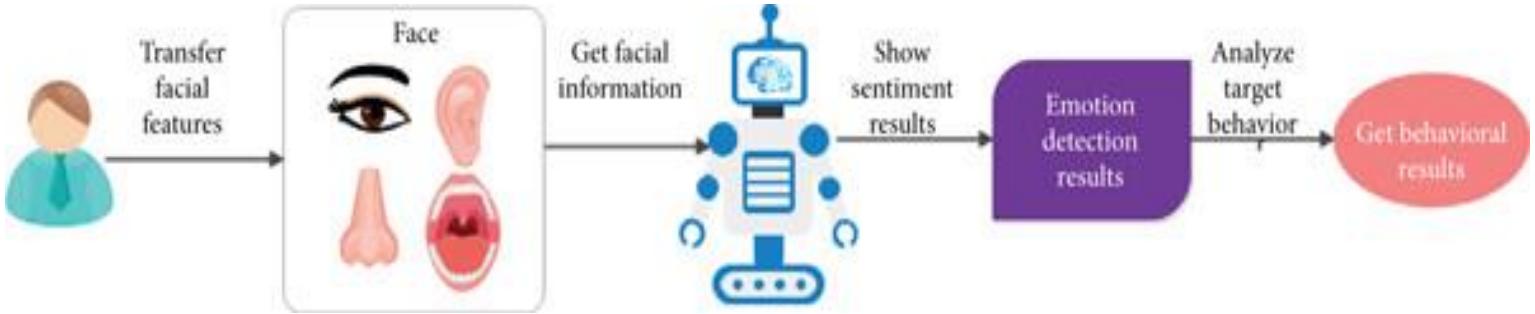
- Methodology



- UI Illustration



- Process flow for Capturing NMFS



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FEASIBILITY AND VIABILITY

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Compatibility with Mobile Devices

Most smartphones and tablets have high-quality cameras and enough processing power to support gesture recognition models, so users can practice easily on their own devices.

Scalability Factor

The application can be easily scaled by adding new sign language datasets or improving AI models to increase accuracy and support additional languages or dialects.

Cost-Effectiveness

Open-source AI libraries and pre-existing datasets can reduce the cost of development and implementation.

Educational Benefits

Interactive features and personalized learning paths can make it engaging and boost user retention.

Challenges	Solutions
1 User Acceptance and Usability	Engage actual ISL users for testing. Design an intuitive interface and provide training resources.
2 Legal and Ethical Considerations	Comply with data privacy laws and obtain consent. Work with legal experts on intellectual property and cultural sensitivity.
3 Offline Functionality	Develop lightweight models. Utilize local storage solutions to ensure core functions offline.
4 Diverse Lighting and Background	Implement background subtraction and lighting normalization. Use data augmentation in training.

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IMPACT AND BENEFITS

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Global Communication
1 Enables effective communication between deaf individuals and the hearing population across different countries using ISL, ASL, BSL, and CSL.

Wider Accessibility
2 Increases accessibility for sign language users worldwide, providing a universal platform for communication.

Cross-Cultural Inclusion
3 Promotes inclusion by breaking down language barriers for deaf communities across diverse cultural and linguistic regions.

Empowerment of Global Deaf Communities
4 Enhances independence and participation in social and professional environments for deaf individuals across various countries

Job Opportunities
5 Potentially increases employment opportunities for ISL users in various fields such as customer service and education.

Cultural Preservation
6 Helps document and preserve Indian Sign Language, including regional variations and non-manual features

Real-time Translation
Enables instant translation of sign language into text, facilitating immediate communication in diverse settings, including emergencies. 1

User-Friendly Interface
Designed for ease of use, making it accessible for both experienced sign language users and those new to learning sign languages. 2

Enhanced Learning Resources
Offers a valuable tool for learning multiple sign languages, catering to both deaf and hearing individuals interested in sign language education 3

Family Communication
Families with both deaf and hearing members can leverage the power of your app to facilitate seamless communication at home 4

Business meetings
Professionals in diverse industries can use your translator application to ensure effective communication during business meetings and conference. 5

RESEARCH AND REFERENCES

- Details / Links of the reference and research work

- https://www.researchgate.net/publication/382805966_Emotion-Aware_Indian_Sign_Language_Recognition_A_Multimodal_Approach_With_Sign-Expression_Correlation_Analysis
- https://www.degruyter.com/document/doi/10.1515/jisys-2022-0001/html?lang=en
- http://www.youtube.com/playlist?list=PL0aoTDj9NwgjLj4zei6P1jZH8sQ5YRpQK
- https://www.irjet.net/archives/V9/i4/IRJET-V9I4506.pdf