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GUVI - Naan Mudhalvan Engineering Hackathon 2025

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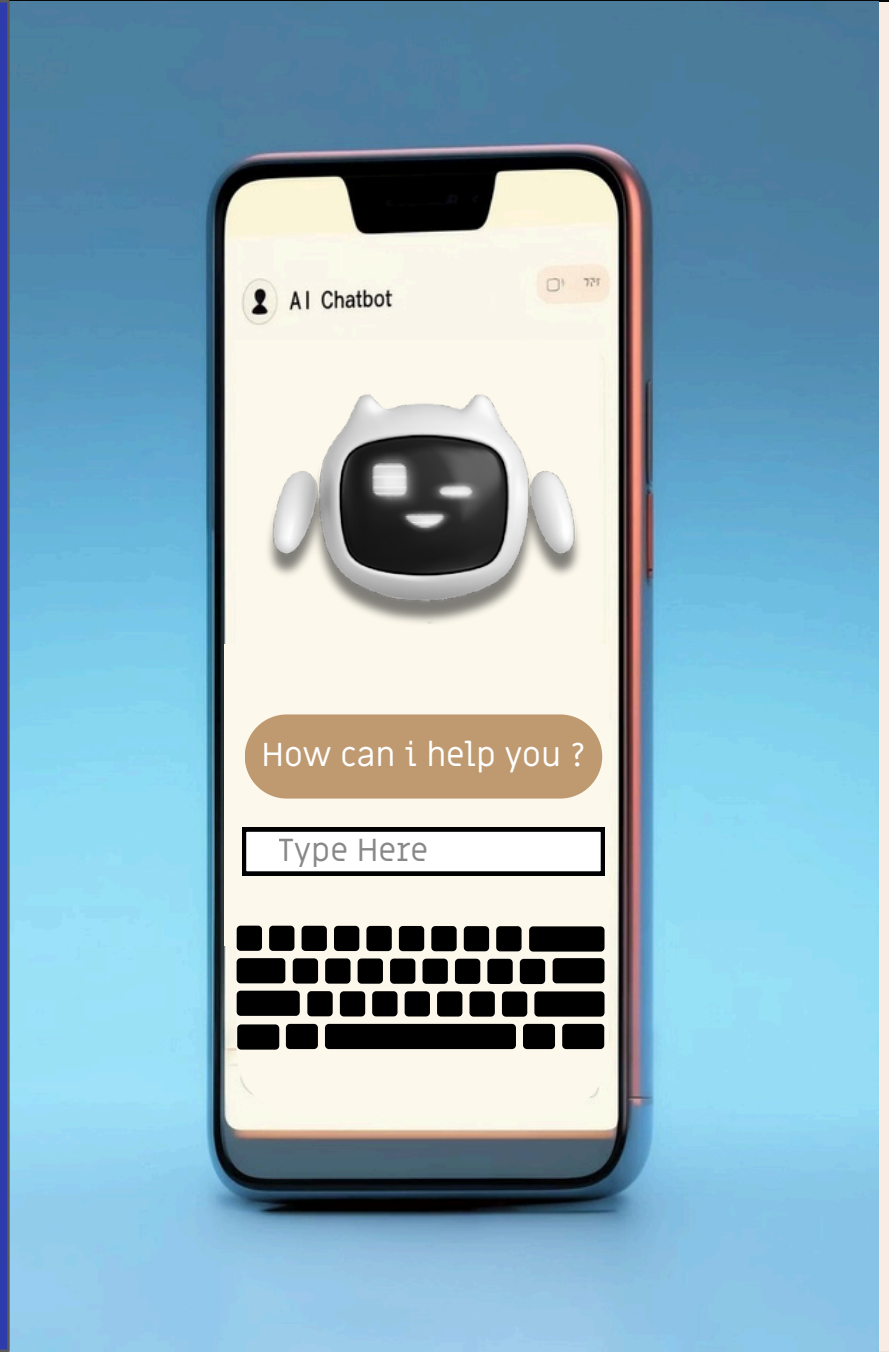

Problem Statement :

To Build a Smart AI-Powered Chatbot for Customer Support System

By The Dark Knights

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Challenges in Modern Customer Support Systems

Scalability Issues

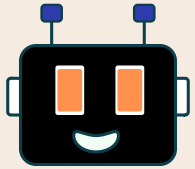
Human teams cannot provide 24/7 support at scale, leading to delayed responses and lost trust.

Informal & Multilingual Language

Customer queries often contain slang, mixed dialects, and multiple languages, complicating interpretation for rule-based systems.

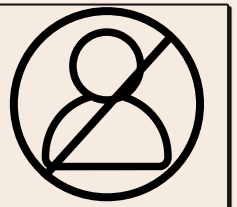
Context & Intent Misunderstanding

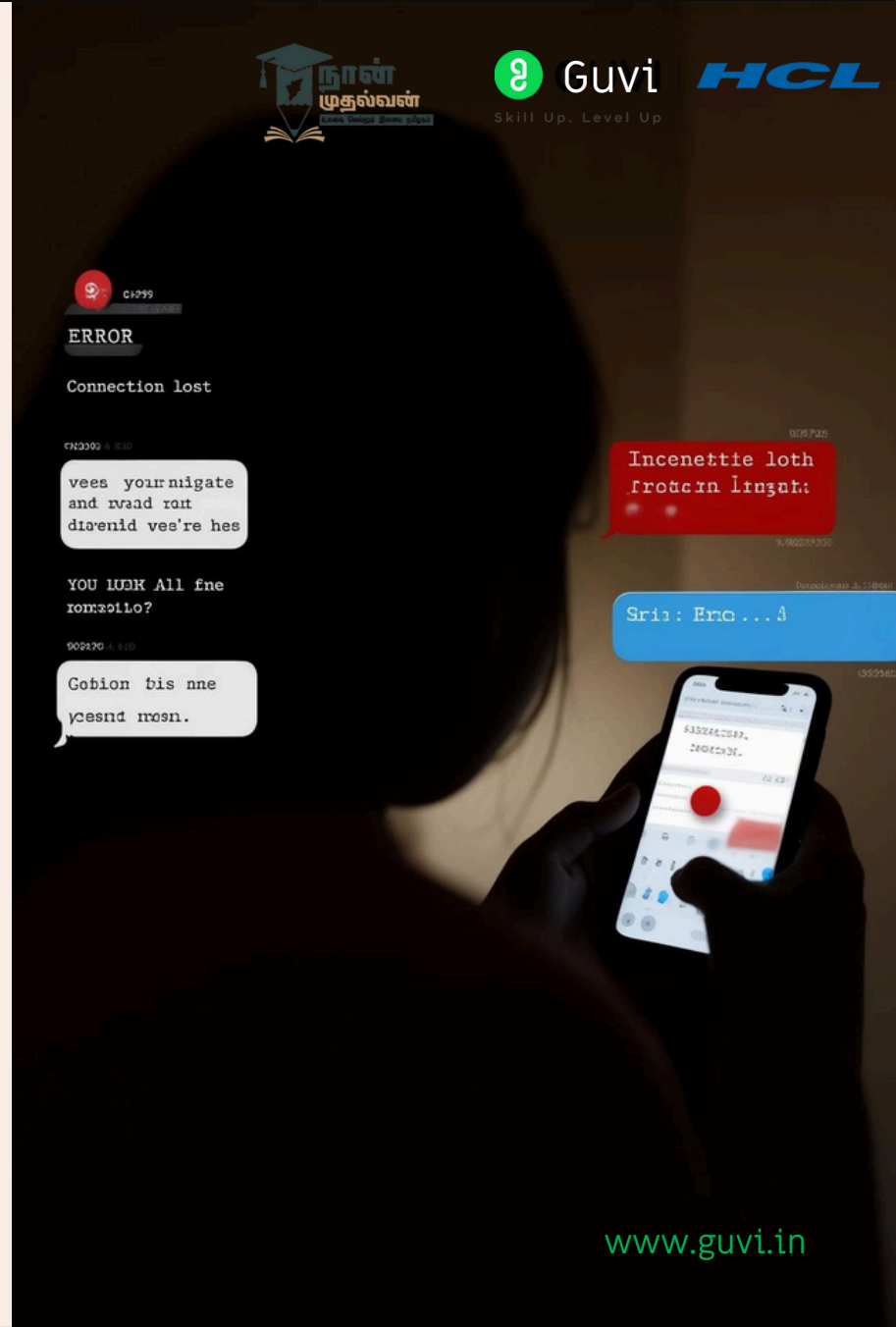
Many chatbots fail to decode true user intent or handle ambiguous inputs, resulting in irrelevant or robotic answers.



Customer Drop-offs

Irrelevant replies cause customers to abandon conversations prematurely, impacting satisfaction and retention.





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OBJECTIVES OF THE SMART CHATBOT FOR CUSTOMER SUPPORT

Advanced Intent Recognition

Achieve 90% accuracy in identifying user intent, enabling precise and relevant responses.

Dynamic, Personalized Responses

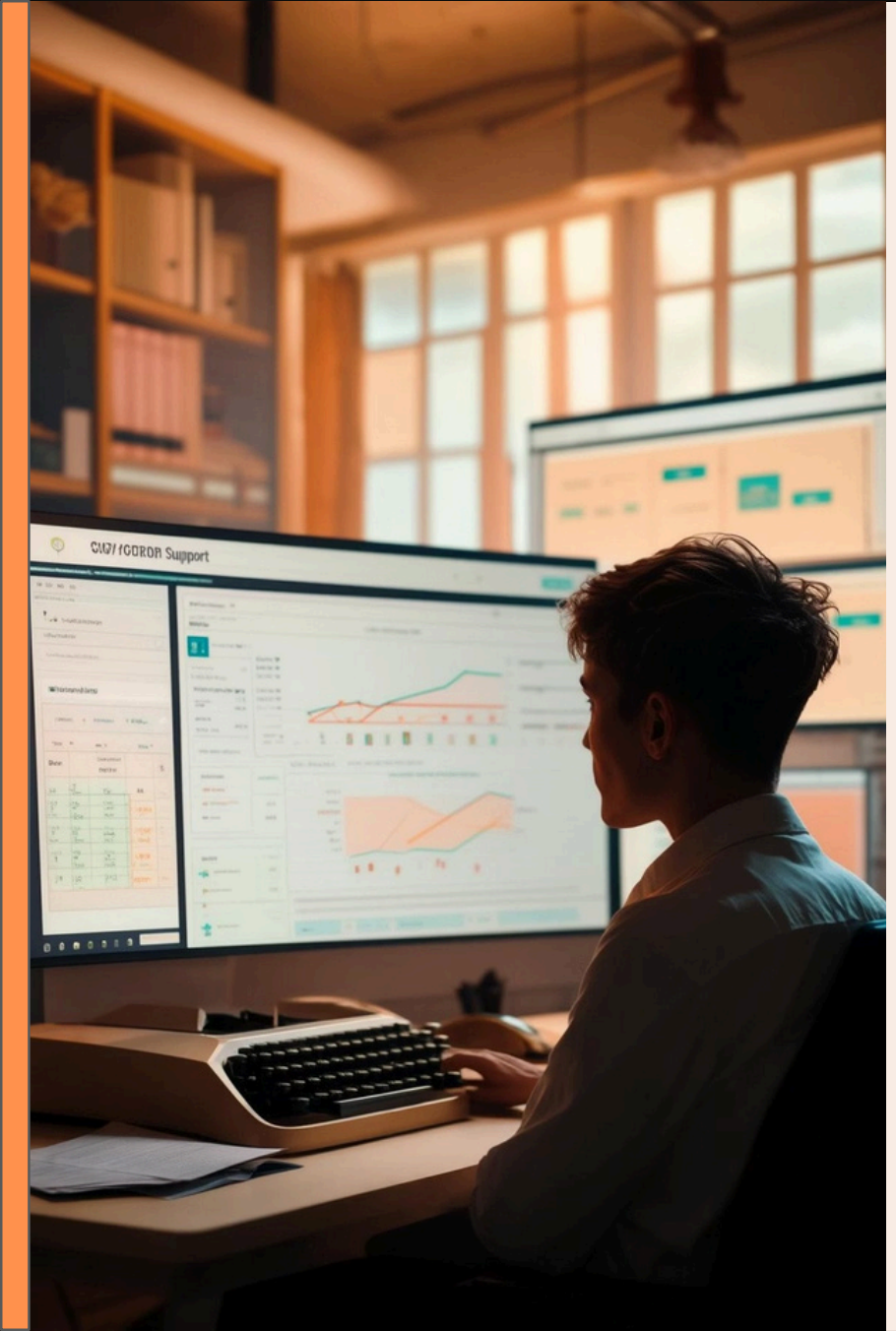
Generate human-like, evolving replies that adapt based on past user interactions and sentiment.

Contextual and Multilingual Support

Maintain context across interactions and support various languages seamlessly for global customers.

Scalability and Cost-effectiveness

Provide a solution scalable from startups to enterprises, optimizing handling times by up to 60%.



Exploratory Data Analysis (EDA) Insights

1

Query Volume & Types

Identified frequent complaint categories and service inquiry patterns to prioritize bot capabilities.

2

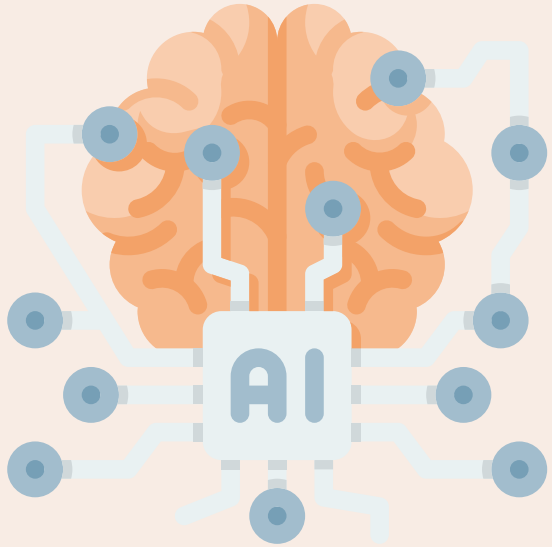
Language & Sentiment Distribution

Detected multilingual input patterns and sentiment trends to improve linguistic and emotional responses.

3

Response Length & Drop-offs

Analyzed average conversation lengths and pinpointed key drop-off moments indicating user dissatisfaction.



Machine Learning & NLP Algorithms Applied

Text Representation
TF-IDF and Cosine Similarity for effective FAQ matching and text vectorization.

Classification Algorithms
Logistic Regression, Decision Trees, and Naive Bayes deployed for intent classification.

Deep Learning Models
RNN, LSTM, and Transformer-based BERT fine-tuning for context understanding and sequence modelling.

NLP Techniques
Named Entity Recognition with SpaCy and sequence-to-sequence models for dynamic response generation.

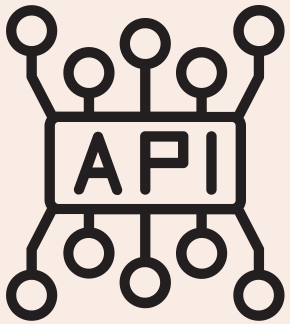
Development Tools and Technologies

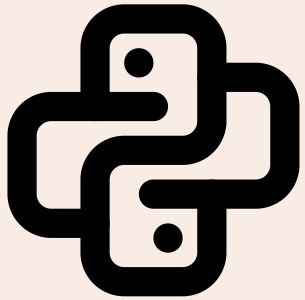
Programming & NLP

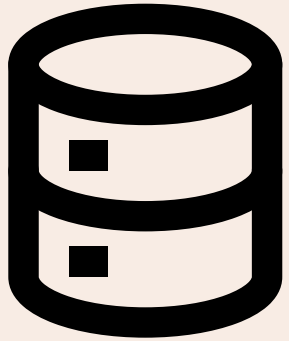
- Python for backend integration
- NLTK and SpaCy for language processing tasks
- Hugging Face Transformers for model fine-tuning

Deployment & Interface

- Flask and Streamlit for API and UI Dialogflow for
- conversational flow management MongoDB for
- scalable data storage and logging







Expected Outcomes and Performance Metrics

90%

Intent Recognition Accuracy

Leveraging advanced models to correctly interpret user queries with high precision.

85%

User Satisfaction Rate

Improved customer experience through personalized, context-aware interactions.

60%

Reduction in Average Handling Time

Efficient automation decreasing workload on human agents and accelerating query resolution.

Conclusion & Next Steps

Prototype Development

Build initial chatbot engine and integrate core algorithms for testing.

Iterative Enhancement

Use user feedback and logged data to continuously refine language models and response quality.

Scalable Deployment

Implement scalable infrastructure to support global customers with real-time performance and work on it more

Performance Monitoring

Track key metrics and sentiment to ensure consistent improvement and customer satisfaction.

Thank You!

Project Demo

GitHub Link