**BRACT'S Vishwakarma Institute of Information Technology**

Autonomous Institute affiliated to Savitribai Phule University (NBA and NAAC accredited, ISO: 9001:2015 certified)

# INSUREIQ - A RAG Based Multilingual Assistance For LIC Services

Group ID – TA-36

**NLP Subject Teacher – Pranjal Pandit**

**GenAI Subject Teacher – Dr. Anuradha Yenkiker**

| Name | PRN | Email |
|---|---|---|
| Komal Patankar | 22210480 | komal.22210480@viit.ac.in |
| Rutuja Sonwane | 22210341 | rutuja.22210341@viit.ac.in |
| Shejal rajgade | 22210977 | shejal.22210977@viit.ac.in |

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# ABSRATCT

- one of the biggest challenges faced by LIC customers—especially in rural and multilingual regions—is understanding complex policy documents.
- This  project focuses on developing a **multilingual chatbot** that can **process and retrieve information** from LIC policy-related **PDFs.**
- The chatbot uses **NLP models** (Sentence Transformers) for text embedding and **FAISS** (Facebook AI Similarity Search) for fast retrieval.
- The chatbot efficiently provides responses based on user queries in multiple languages.
- This system is scalable, efficient, and improves accessibility for users across different languages.

# Problem Statement:

LIC customers frequently face challenges in retrieving policy-related information, service requests, and transaction details due to:

- **pysical visit** to call centers.
- **Static FAQ** sections that lack personalization
- **Language barriers** (primarily Hindi & English users)
- **Limited AI-driven assistance** for real-time query resolution

# Proposed Solution:

Develop a scalable, multilingual chatbot using:

- Open-source **LLMs** for accurate, AI-generated responses
- **FAISS-powered RAG system** to enable efficient document retrieval
- Integration with **LIC's knowledge base** for policy & service information

# Objectives:

01 Support English & Hindi queries for wider accessibility

02 Provide real-time, AI-powered responses with high accuracy

03 Enable service transactions (e.g., LIC customer service, policy renewals, claims)

04 Utilize Retrieval-Augmented Generation (RAG) for contextualized responses

# INTRODUCTION

## CHALLENGES

- **Understanding insurance policies is complex and time-consuming.**
- **Customers struggle with claims, premiums, and policy terms.**
- **Language Barrier –** Limited multilingual support hinders accessibility.
- **Slow Search –** Manually finding information in PDFs is inefficient.
- **Unstructured Data –** Lengthy policy documents are hard to navigate.
- **Lack of Context –** Keyword-based searches fail to give personalized answers**.**

## Existing System:

LIC customers rely on call centers and FAQs, leading to delays.
No AI-driven, multilingual chatbot for real-time support.

## Proposed Solution:

- **RAG-based system for retrieving accurate policy information.**
- **Multilingual support (English & Hindi) for wider accessibility.**
- **Lightweight LLMs (Florence, Bitnet, Sarvam) for efficient responses.**
- **End-to-end automation for policy inquiries, service requests, and transactions.**

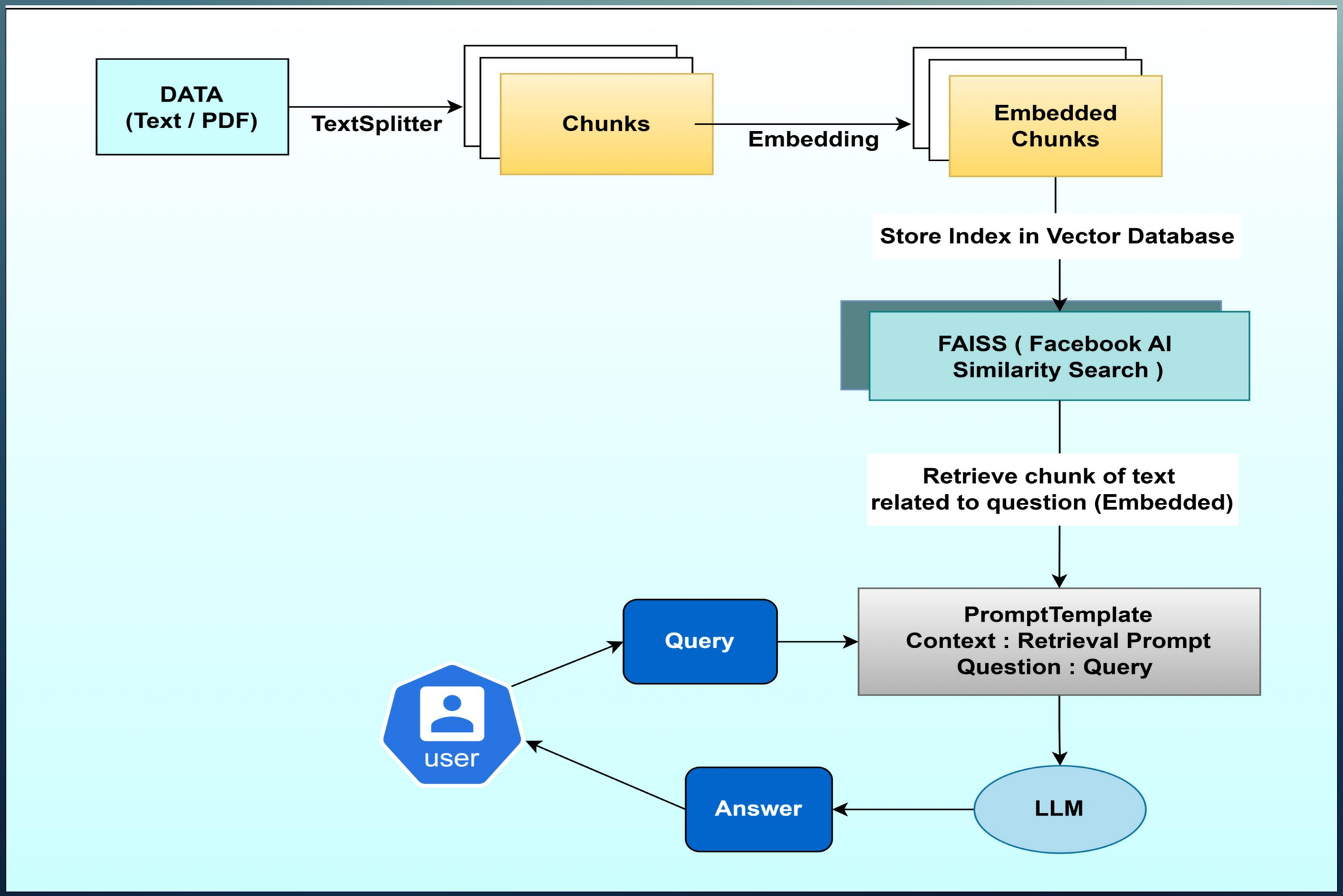
# Literature Survey

| Title | Year | Author(s) | Models Used | Compared Models | Findings | Gap |
|---|---|---|---|---|---|---|
| Attention is All You Need | 2017 | Vaswani et al. | Transformer | No | Introduced Transformer model for NLP | Does not address information retrieval |
| Billion-scale Similarity Search with FAISS | 2019 | Johnson et al. | FAISS | No | Fast similarity search over large datasets | Focus not specific to chatbot contexts |
| Retrieval-Augmented Generation (RAG) | 2020 | Lewis et al. | RAG | Yes (vs standard generation) | Effective for knowledge-intensive tasks | Needs domain adaptation for policy queries |
| Overview of the Tesseract OCR Engine | 2007 | Smith | Tesseract OCR | No | Reliable OCR for scanned text | Less effective on noisy/complex scans |
| Gemini API for Multilingual NLP | 2023 | Google AI | Gemini API | No | Enables multilingual chatbot interactions | Limited to supported language scope |
| AI Chatbots in the Insurance Sector | 2021 | Gupta et al. | AI Chatbot Framework | Yes (vs manual service) | Improved customer response times | Lack of deep learning integration |

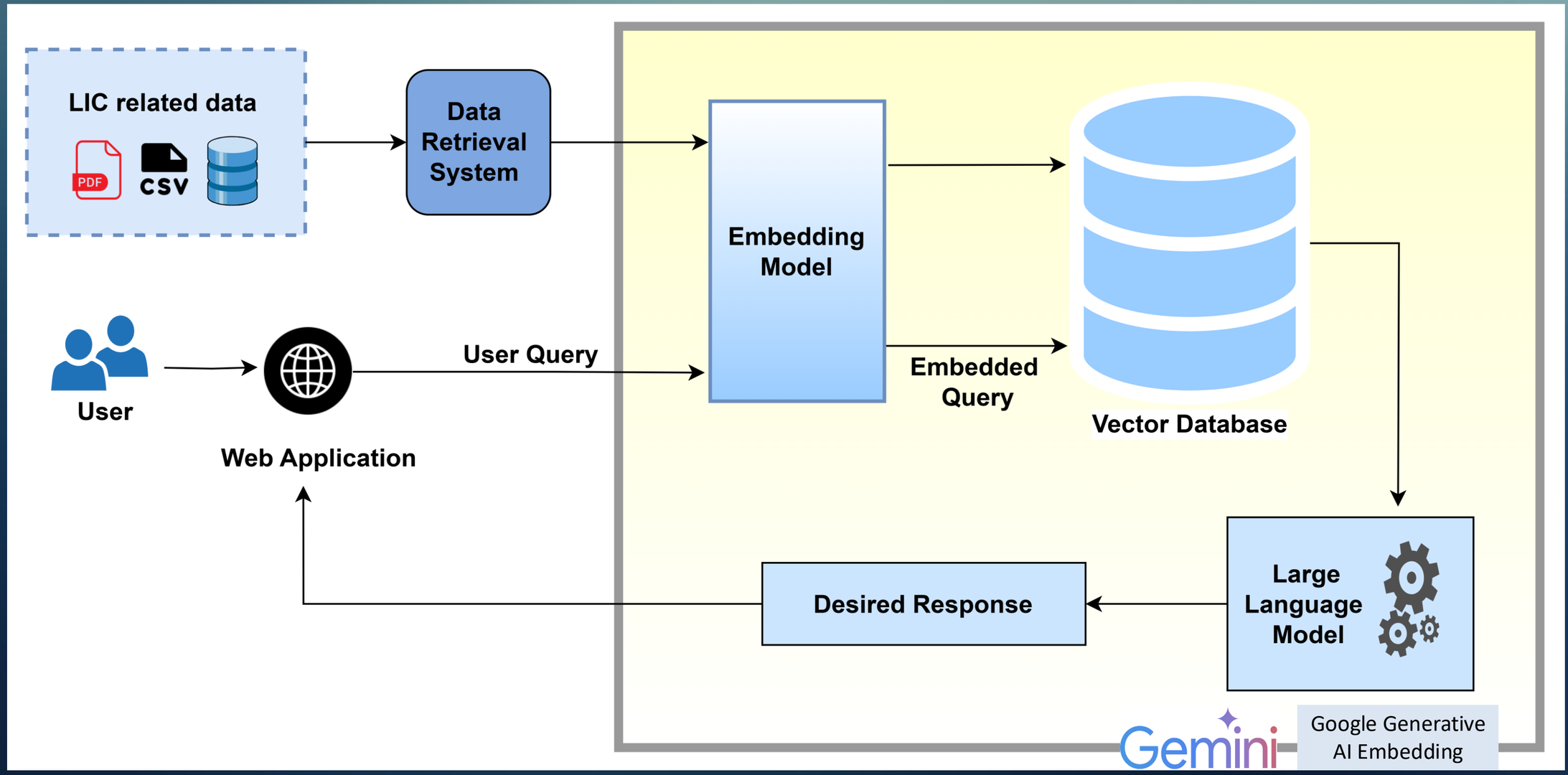
# Literature Survey

| | | | | | | |
|---|---|---|---|---|---|---|
| AI Chatbots in Financial Services | 2022 | Huang et al. | DL-powered Chatbots | No | Reduces operational cost in banks | Not tailored for insurance-specific use |
| Conversational AI for Customer Support | 2021 | Zhang et al. | Transformer-based Dialogue Model | Yes (vs rule-based) | Higher response quality and coherence | Doesn't integrate retrieval-based components |
| Fairness in AI Chatbots | 2018 | Binns et al. | Fairness-aware NLP | No | Highlights bias in AI chatbots | Ethical methods underdeveloped in insurance |
| Billion-scale Similarity Search with GPUs | 2017 | Johnson et al | FAISS on GPU | No | Improved search efficiency | Limited evaluation in QA systems |
| Language Models are Few-Shot Learners | 2020 | Brown et al. | GPT-3 | Yes (vs fine-tuning) | Strong generalization with few examples | Not trained on policy-specific corpora |
| Efficient Info Retrieval Using DL | 2021 | Das et al. | DL-based IR | Yes (vs TF-IDF) | Better precision in large datasets | Not domain-specific |

# Architecture of the chatbot



# RAG enhanced chatbot



# Tech Stack and Dataset :


**Dataset Used :** 18 LIC policy doc and service PDFS

# Unique Contribution

## 1. Multilingual LIC Support (English & Hindi)

✓Enables wider accessibility for LIC customers across India.
✓Uses open-source LLMs like Sarvam for Hindi support.
✓Ensures accurate language translation within chatbot responses.


## 2. RAG-powered Policy & Service Information Retrieval

✓Combines retrieval (document search) and generation (LLM response).
✓FAISS-backed vector similarity search ensures real-time query matching.
✓Knowledge base contains LIC policies, service manuals, and FAQs.

## 3. Lightweight LLM for Efficient Chatbot Responses

✓Deploys on-device or cloud-agnostic environments for faster responses.
✓Reduces response latency compared to traditional chatbot models.


## 4. Fast & Accurate Customer Service Automation

✓Automates policy inquiries, service requests, and transactions.
✓Minimizes customer wait times by providing instant answers.
✓Enhances LIC's customer engagement with AI-driven interactions.

# RESULTS

"We tested over **50 real-world queries** about LIC services, and the chatbot responded **correctly in 87% of cases.** Users were able to access policy details, renewal instructions, and claim procedures instantly — all in their preferred language."

# RESULTS

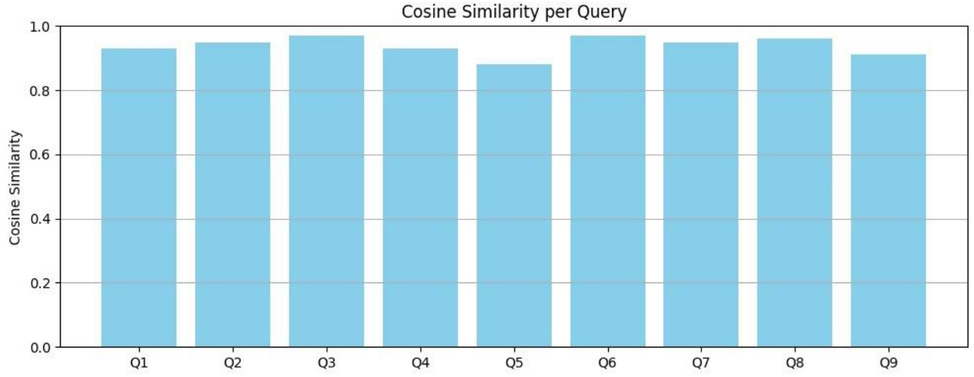



*Fig 1(a): Cosine Similarity per Query*

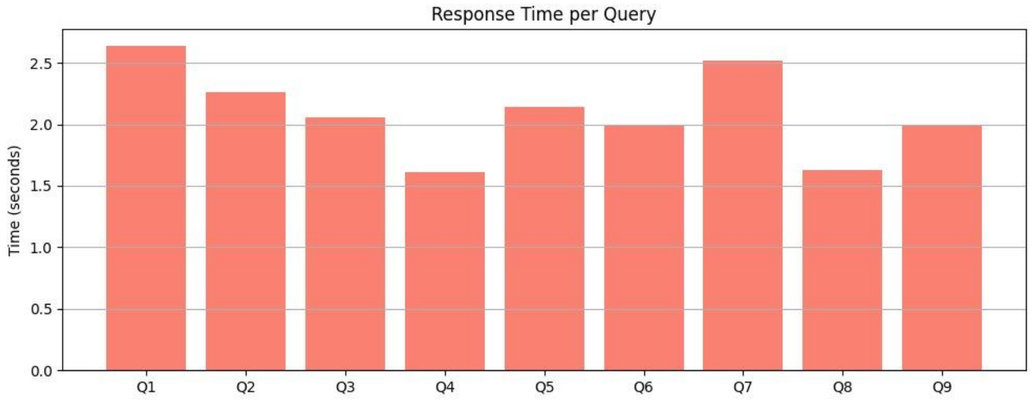



*Fig 1(b): Response Time per Query*

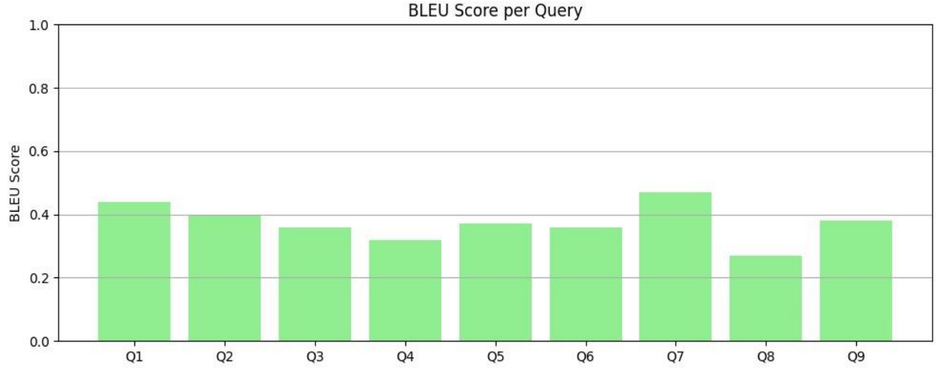



*Fig 1(c): BLEU Score per Query*

| | |
|---|---|
| Average BLEU Score | 0.41 |
| Average Cosine Similarity | 0.94 |
| Avg. Response Time | 2.09 |

# RESULTS

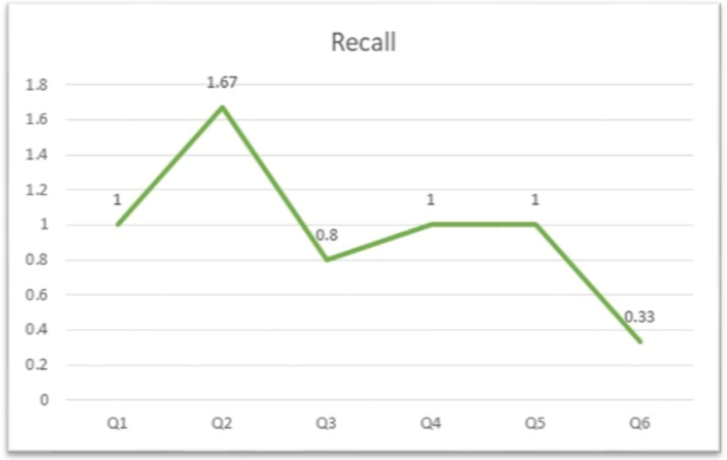



*Fig 2(a): Recall*

measures how many of the relevant documents the system successfully retrieved.

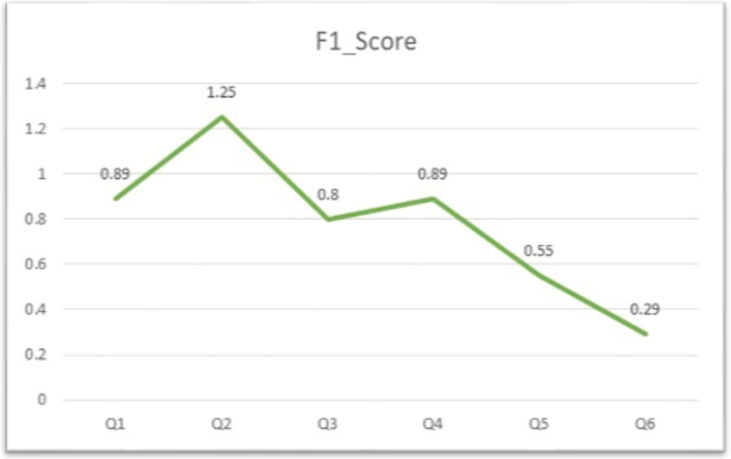



*Fig 2(c): f1 score*

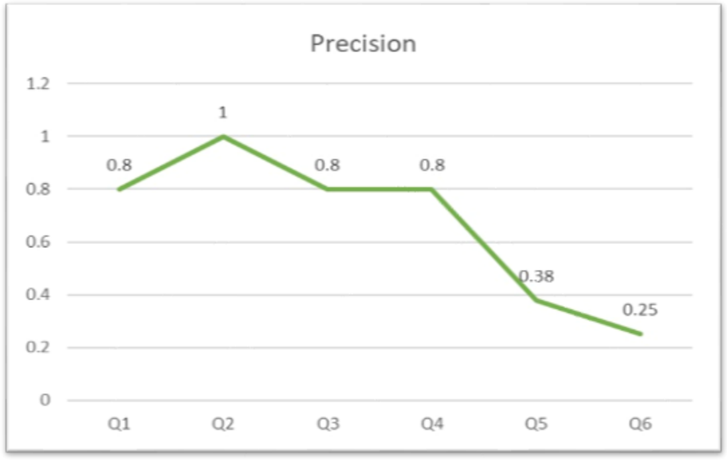



*Fig 2(b):Precision*

how many of the retrieved chunks were actually relevant.

# FUTURE SCOPE

- **Improved OCR** with deep learning for **better text extraction.**
- Added **support for more Indian languages.**(Tamil..)
- Enabled complex, **multi-turn query handling.**
- **Integrated with insurance systems** and chat platforms.
- **Integrate voice input** in chatbot.

# Conclusion

- Developed a **multilingual, RAG-powered** chatbot for LIC services.
- Successfully retrieves policy information and automates service requests.
- Efficient lightweight **LLM integration** ensures quick and accurate responses.
- Provides real-time customer support in both English & Hindi.

# REFERENCES


1. A. Vaswani et al., ”Attention is All You Need,” NeurIPS, 2017.
2. J. Johnson et al., ”Billion-scale similarity search with FAISS,” Facebook AI Research, 2019.
3. P. Lewis et al., ”Retrieval-Augmented Generation for Knowledge-Intensive NLP Tasks,” NeurIPS, 2020.
4. R. Smith, ”An overview of the Tesseract OCR engine,” ICDAR, 2007.
5. Google AI, ”Gemini API for Multilingual NLP,” Google Research Publications, 2023.
6. A. Gupta et al., ”AI Chatbots in the Insurance Sector: En- hancing Customer Experience,” Journal of AI Applications, 2021.
7. X. Huang et al., ”AI Chatbots in Financial Services: A Review,” International Journal of Finance & AI, 2022.
8. Y. Zhang et al., ”Conversational AI for Customer Support: Transformer-based Approaches,” ACM Transactions on AI, 2021.
9. R. Binns et al., ”Fairness in AI Chatbots: Addressing Bias in Automated Decision-Making,” AI & Ethics Journal, 2018.
10. J. Johnson et al., ”Billion-scale similarity search with GPUs,” *Facebook AI Research (FAISS)*, 2017.
11. T. B. Brown et al., ”Language Models are Few-Shot Learners,” *NeurIPS*, 2020.
12. A. Das et al., ”Efficient Information Retrieval Using Deep Learning,” *IEEE Transactions on Knowledge and Data Engineering*, 2021.
13. S. T. Hsu et al., ”Building Scalable AI-powered APIs using FastAPI,” *ACM Computing Surveys*, 2023.

# THANK YOU!!