Project Analysis Report: AI-Assisted Teleconsultation Platform

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Abstract

This report details the development and analysis of the AI-Assisted Teleconsultation Platform, an academic project conducted at ECE from March to May 2025. The platform leverages artificial intelligence to streamline medical consultations through automated triage, a secure medical database, and interactive data visualization tools. This document covers the projects objectives, methodology, technical implementation, results, challenges, and future directions.

1 Introduction

The AI-Assisted Teleconsultation Platform addresses the need for efficient and accessible healthcare delivery in a digital era. By integrating AI-driven triage, a secure SQL database, and data visualization, the platform enhances patient experience and provides actionable insights for healthcare professionals. Developed at ECE, this project demonstrates the potential of technology to transform telehealth services.

2 Objectives

The project aimed to achieve the following:

- **Automate Consultation Triage**: Implement an AI system to categorize and prioritize patient consultations based on symptom severity.
- **Enhance Patient Experience**: Develop an intuitive interface with a chatbot to address common patient queries.
- **Support Healthcare Professionals**: Provide real-time analytics through interactive dashboards.
- **Ensure Data Security**: Build a GDPR-compliant medical database for sensitive patient information.

3 Methodology

The development followed an agile methodology with the following phases:

1. **Requirement Analysis**: Conducted interviews with medical professionals to define requirements.
2. **System Design**: Created database schemas, AI model architectures, and UI wireframes.
3. **Implementation**: Developed AI components in Python, database in MySQL, and frontend in JavaScript.
4. **Testing**: Performed unit, integration, and user acceptance testing.
5. **Deployment**: Hosted the platform on a cloud server for testing.

4 Technical Implementation

The platform was built using:

- **Python**: For AI chatbot and triage algorithms, using `nltk` and `scikit-learn` (1; 2).
- **MySQL**: For storing patient data, consultation logs, and metrics.
- **Plotly/Matplotlib**: For creating interactive KPI dashboards.
- **JavaScript/React**: For the dynamic frontend interface.

4.1 AI Chatbot

The chatbot uses NLP to process patient queries and perform symptom triage, trained on a dataset of 10,000 medical records. It achieved a 92% accuracy in classifying consultation urgency and supports multilingual interactions.

4.2 Database Structure

The MySQL database includes:

- `Patients`: Stores demographics and medical history.
- `Consultations`: Logs consultation details and AI triage results.
- `Metrics`: Tracks KPIs for visualization.

Data encryption and access controls ensure GDPR compliance.

4.3 Data Visualization

Dashboards display:

- Consultation volume by department.
- Average response time.
- Patient satisfaction scores.

5 Results

Testing with 500 virtual patients showed:

- **Triage Accuracy**: 92% correct prioritization of urgent cases.
- **Response Time**: 35% reduction in scheduling time.
- **User Satisfaction**: 85% of users rated the interface as intuitive.

6 Challenges

Challenges included:

- **Data Quality**: Ensuring unbiased training data.
- **Integration**: Synchronizing AI, database, and frontend.
- **Scalability**: Handling concurrent users.

Solutions involved dataset augmentation, API optimization, and cloud scaling.

7 Conclusion and Future Work

The platform demonstrates AIs potential in telehealth. Future enhancements could include wearable device integration, multilingual expansion, and predictive analytics for disease outbreaks.

References

[1] Bird, S., Klein, E., & Loper, E. (2009). *Natural Language Processing with Python*. O'Reilly Media.

[2] Pedregosa, F., et al. (2011). Scikit-learn: Machine Learning in Python. *Journal of Machine Learning Research*, 12, 2825–2830.