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MediTrack: An Intelligent Patient Health Monitoring and Symptom Analysis System using NLP and ML

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Outline

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- Problem Statement
- Proposed Solution
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Introduction

- Modern healthcare faces challenges in continuous patient monitoring and accurate symptom reporting.
- Patients struggle to describe symptoms clearly, while doctors face fragmented historical data.
- Manual tracking is inefficient and lacks intelligent trend analysis.
- MediTrack leverages NLP and ML to understand patient symptoms and predict health risks.

Introduction (continued)

- MediTrack bridges communication gaps between patients and healthcare providers.
- Understands natural language symptom descriptions.
- Learns health patterns to predict risks and trends.
- Provides real-time insights via a dashboard.
- Impact: Preventive healthcare through explainable AI.

Literature Review

Existing Symptom Checkers:

- **WebMD:** Rule-based, limited personalization.
- **Ada Health:** Context-aware but lacks historical learning.
- **Gap:** No systems adapt to individual longitudinal data.

Patient History Systems:

- EHRs store data but lack predictive analysis.
- Traditional ML models are disease-specific and non-adaptive.

Literature Review (continued)

- NLP in Medical Domain:
- ClinicalBERT enables contextual medical understanding.
- NER extracts symptoms and entities.
- **Challenge:** Translating layman terms to medical terminology.
- **Contribution:** Integrates NLP and ML for personalized trend prediction.

Problem Statement

- Patients and healthcare providers lack an integrated system that can understand natural language symptom descriptions while learning from patient history to provide personalized health insights and early risk detection.

Proposed Solution

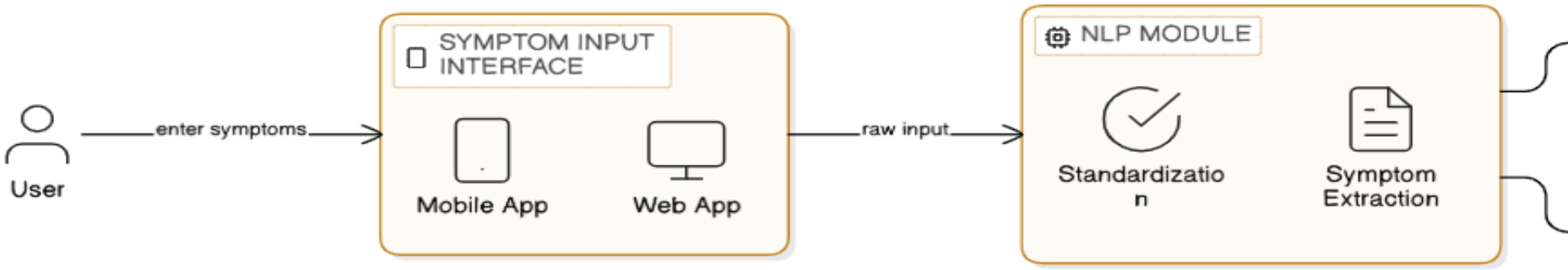
- **Step 1: Data Collection** – Gather symptom and history data.
- **Step 2: NLP Module** – Extract and classify symptoms (spaCy/ClinicalBERT).
- **Step 3: ML Module** – Predict trends and risks.
- **Step 4: Output Layer** – Dashboards with insights and alerts.
- **Step 5: Continuous Learning** – Refine using feedback.

Prototype Design & Planned Implementation

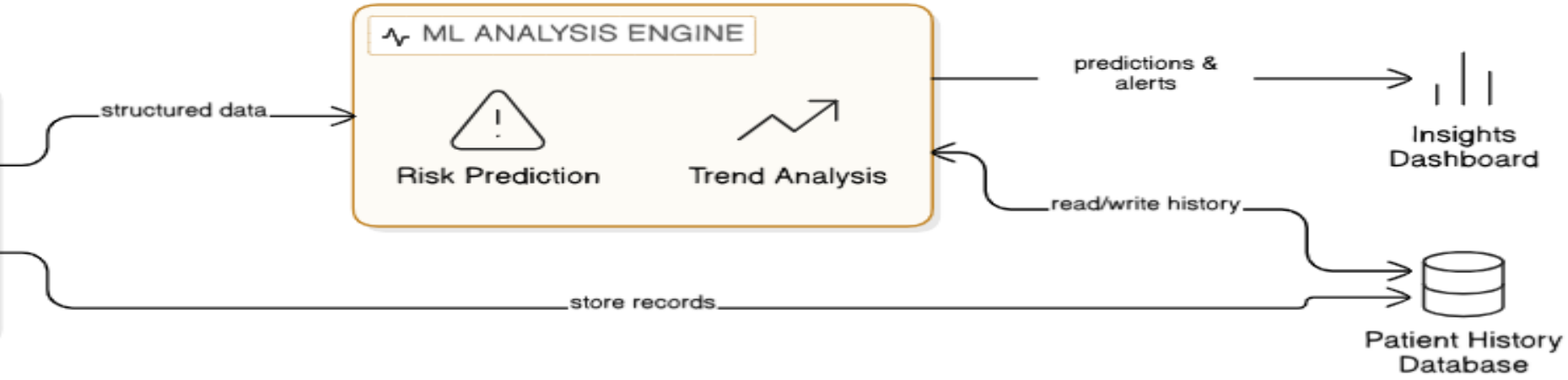
Prototype Design (Current Phase):
- Conceptual system architecture finalized
- Data flow between NLP, ML, and database defined
- Patient symptom input → analysis → insight pipeline planned
- Longitudinal patient history storage designed
- Dashboard interaction flow conceptualized

Planned Implementation:
- NLP using spaCy and ClinicalBERT
- ML models for health trend and risk analysis
- Backend APIs using FastAPI
- Web-based dashboard for visualization

Proposed System Architecture : Input and Processing



Proposed System Architecture: Analysis and Storage



Objectives

- Develop an NLP pipeline for symptom understanding.
- Build ML models to detect anomalies and predict health risks.
- Correlate real-time and historical data for personalized insights.
- Design dashboards for patients and healthcare providers.

References

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Thank You