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Smart Hospital Admission using AI and Informatica

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Abstract - Hospital admissions remain a significant bottleneck in healthcare operations, primarily due to redundant paperwork, repetitive insurance verification, and manual identity authentication. These inefficiencies not only prolong patient waiting times but also increase administrative burden and the risk of human errors. This work proposes an **AI-driven Smart Hospital Admission System** powered by **Informatica Intelligent Data Management Cloud (IDMC)**, Generative AI (GenAI), and advanced Machine Learning (ML) techniques. The system leverages **OCR-based Aadhaar scanning, Natural Language Processing (NLP), and context-aware vector search** to automate patient identification, seamlessly retrieve prior medical and insurance records, and validate claims in near real time. Predictive ML models further optimize doctor allocation, resource planning, and fraud detection. The proposed approach is expected to **reduce admission time by up to 80%, eliminate manual paperwork, and significantly enhance patient satisfaction**, thereby marking a paradigm shift in healthcare digitalization.

Key Words: AI, Healthcare Automation, Informatica IDMC, Generative AI, Patient Admission, Insurance Fraud Detection

1.INTRODUCTION

The healthcare ecosystem is undergoing rapid digital transformation, yet **hospital admission processes remain largely manual, repetitive, and error-prone**. Patients are often required to re-submit **identity proofs, insurance documents, and medical history records** during every admission, leading to inefficiencies, delays, and dissatisfaction. Moreover, manual insurance validation can take several hours, thereby hampering both **patient experience** and **hospital operational efficiency**.

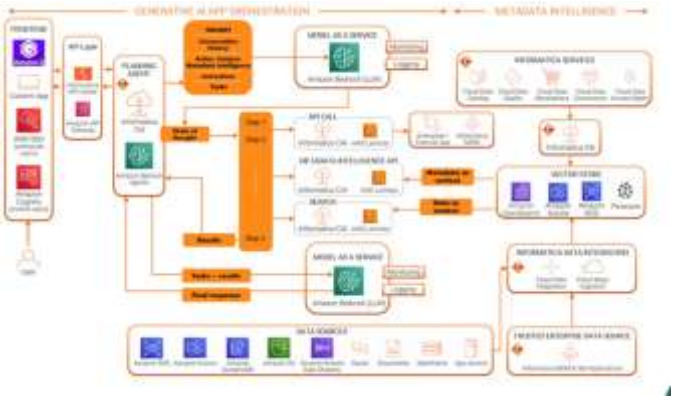
Existing digital solutions such as **Electronic Health Records (EHRs)** and **Hospital Information Systems (HIS)** have improved record storage but lack **AI-driven automation and real-time interoperability with insurers**. This gap has necessitated a **smarter, integrated approach**.

2. Previous Work

Several studies highlight how AI-driven hospital automation reduces patient wait times and improves accuracy, particularly through electronic health records **(EHRs), AI-based triage, and real-time benefit verification. Existing systems rely on OCR/NLP** for document processing, patient matching algorithms, and machine learning models for fraud detection. However, most approaches address these components in isolation, lacking a unified framework. Current gaps include limited interoperability, slow insurance validations, and minimal integration of identity verification with fraud-aware claim processing. This work advances the field by proposing an end-to-end admission automation system combining **IDMC services, GenAI, and ML** techniques for seamless, paperless hospital admissions.

3. System Architecture and Design

3.1 Reference Architecture



3.2 System Design

In this research, we propose an **Automated Patient Admission Framework** that integrates **Informatica IDMC services (CAI, CDI, and EDC)** with **Large Language Models (LLMs)**, **Machine Learning classifiers**, and **vector databases**. The framework facilitates:

- **Automated patient verification** using Aadhaar-based OCR and NLP techniques.
- **Real-time insurance validation** through API integrations with insurance providers.
- **AI-powered fraud detection and anomaly identification** in claims.
- **Predictive analytics** for optimizing doctor and room allocation.

This solution not only **reduces redundant documentation** but also introduces **intelligent, context-aware automation** in hospital workflows. By combining **cloud-native data integration** with **AI-based decision-making**, the system aims to redefine how healthcare admissions and insurance processing are managed in the **post-digital healthcare era**.

4. Implementation Details

Requirement Analysis & Design

- Defined hospital data sources, EHR standards (FHIR/HL7), and insurance API integrations.
- Selected OCR/NLP tools (AWS Textract, SpaCy, BERT) and designed secure cloud architecture.

Data Extraction & Preprocessing

- OCR pipelines extract Aadhaar/UHID details.
- NLP models structure demographics and medical history.
- Data quality ensured through Informatica CDI and IDQ.

Integration with EHR & Insurance Systems

- CAI APIs enable real-time communication between hospital systems and insurers.
- EDC validates patient record mapping and prevents duplication.

AI-Driven Admission & Claim Processing

- ML models predict treatment costs, detect fraud, and auto-approve claims.
- LLMs streamline insurance pre-approvals for faster validation.
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Testing, Deployment & Monitoring

- Continuous integration and deployment (CI/CD) using Docker/Kubernetes.
- Automated testing for OCR accuracy, NLP entity extraction, and API performance.
- Governance and compliance via Informatica EDC and CloudWatch.

5. Conclusions & Future Scope

This work presents an **AI-driven Smart Hospital Admission System** that leverages **Informatica IDMC services, OCR/NLP pipelines, and ML/LLM models** to eliminate redundant paperwork, accelerate insurance validation, and optimize hospital resource allocation. Beyond efficiency, it enhances the overall **patient experience through paperless, real-time, and error-free workflows**.
The current work demonstrates OCR-based document scanning and analysis through conversational bots. Future enhancements will extend this foundation to include **real-time EHR and insurance integration, AI-driven fraud detection, and predictive doctor-room allocation**. Emerging technologies such as **blockchain for secure data exchange** and **federated learning for privacy-preserving AI** can further strengthen scalability and compliance. Together, these advancements will evolve the prototype into a **comprehensive, intelligent, and paperless hospital admission system**.

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