

## TOPIC NAME:

AI MEDICAL PRESCRIPTION VERIFICATION  
LEVERAGING IBM WATSON AND HUGGING  
FACE MODELS

# INTRODUCTION:

Artificial intelligence in healthcare is the application of artificial intelligence (AI) to analyze and understand complex medical and healthcare data. In some cases, it can exceed or augment human capabilities by providing better or faster ways to diagnose, treat, or prevent disease.

# ARCHITECTURE:

1. Input Layer Structured: EHR via FHIR Medication Request Unstructured: Scanned prescriptions → OCR
2. Preprocessing OCR → Text normalization Validate format (FHIR if structured)
3. NLP Extraction (Hugging Face) Models: Clinical BERT / Bio BERT Extract: drug name, dose, route, frequency Normalize → Rx Norm / ATC codes
4. Clinical Rules Engine (IBM Watson) Checks : Drug–drug interactions, allergies, dose limits Uses Watson CDSS and FHIR integration Explainable alerts
5. Context Enrichment Pull patient data (labs, allergies) via FHIR API
6. Output & UX Verified prescription → pharmacist dashboard or chat (Watson Assistant) Provide reason codes & confidence scores
7. Audit & Feedback Log overrides → retrain models Continuous monitoring

# SOLUTION:

Use IBM Watson for drug information retrieval, interaction checks, and chatbot UI (Watson Discovery + Assistant).

Use Hugging Face models for:

OCR + layout extraction (LayoutLMv3 / Donut)NER for medicines, dose, frequency, route (Bio BERT / Clinical BERT)

Normalization to Rx Norm using embeddings + FAISS search.

## Workflow:

1. Prescription image → OCR/layout parsing.
2. Extract medication details (NER + relation extraction).
3. Normalize drugs (Rx Norm mapping).
4. Validate via Watson (interaction, allergy, formulary).
5. Generate verification report + flags.

**Output:** Structured JSON + pharmacist review UI.

**Deployment:** Fast API + Hugging Face inference, IBM Cloud for Watson services.

**Compliance :** HIPAA/GDPR, encryption, human-in-loop for safety.

# FUTURE SCOPE:

- 1 .Advanced OCR & NLP for handwritten/typed prescriptions using Hugging Face models with Watson NLP.
- 2 .Drug interaction, dosage, allergy verification integrated with EHR and clinical guidelines.
- 3 .RAG-powered assistant for pharmacists/doctors to explain alerts.
- 4 .Multi modal checks (text + image) for prescription and drug packaging.
- 5 .Privacy & compliance (HIPAA, data governance, federated learning).
- 6 .Explainable AI & bias monitoring for safe adoption.
- 7 .Integration with hospital/pharmacy systems for real-time verification.
- 8 .AI-driven automation at scale reducing errors, time, and cost in healthcare.

# IMPACT:

1. Improved patient safety by reducing medication errors, adverse drug interactions, and incorrect dosages.
2. Enhanced efficiency for pharmacists and clinicians with automated verification and alert prioritization.
3. Faster decision-making via AI-powered explanations and guideline-backed suggestions.
4. Cost savings through fewer prescription reworks, reduced adverse events, and optimized pharmacy workflow.
5. Scalable healthcare delivery with integration across hospitals, clinics, and telemedicine platforms.
6. Data-driven insights for formulary optimization, trend analysis, and predictive alerts.<sup>1</sup>

## CONCLUSION:

AI-powered medical prescription verification using IBM Watson and Hugging Face models enhances patient safety, reduces medication errors, and improves workflow efficiency. By combining advanced NLP, OCR, and EHR integration, it provides real-time, explainable alerts and scalable solutions for modern healthcare, while ensuring compliance and data privacy.