

Early Detection of Fake Medicines in India

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1. Introduction

The increasing circulation of counterfeit medicines in India poses a serious threat to public health. Many people unknowingly consume fake drugs that lack therapeutic ingredients or contain harmful substances. With the rise of technology, AI, ML, and NLP can be used to detect fake medicines early and protect the public.

2. Problem Statement

Fake medicines are a major national challenge. India has reported thousands of cases involving adulterated, mislabeled, and counterfeit drugs. Traditional verification methods rely on manual inspection or scanning QR codes, which can be easily manipulated. There is a need for an automated AI-based solution that can detect fake medicines through packaging analysis, text extraction, and database cross-checking.

3. Objectives of the Project

- To develop an AI-based platform for identifying counterfeit medicines.
- To analyze packaging details, labels, and anomalies using machine learning.
- To extract and verify printed information using NLP and OCR.
- To build a website interface for users to upload images and verify authenticity.
- To create a mobile-friendly version for easy access.
- To provide awareness and reduce public risk from fake medicines.

4. Proposed Solution

The proposed system uses advanced image processing, machine learning algorithms, and natural language processing to verify medicine authenticity. The platform allows users to upload medicine package images, which are then analyzed for inconsistencies. The extracted text is cross-checked with official pharmaceutical databases to identify mismatches.

5. Website Overview

A fully responsive React-based website was developed with interactive UI, animations, chatbot support, and an AI demo page. Users can upload images, view analysis results, and learn about fake medicine risks.

Website link:

<https://vibe.wix.com/projects/e03e7bd2-022b-40cd-83bc-afea47f3fddf/v/editor>

6. Methodology

- Dataset Collection: Gather images of authentic and fake medicines.

- Preprocessing: Image cleaning, noise removal, cropping, and text enhancement.
- OCR + NLP: Extract text from labels and analyze mismatches.
- Image Analysis: Compare fonts, colors, seals, holograms using ML.
- Model Training: Classification using CNN models such as EfficientNet, MobileNet.
- Deployment: Integration into React website with backend APIs.
- User Testing: Evaluate accuracy, precision, and recall.

7. Key Features of the System

- AI-based detection of fake medicine packaging
- OCR text extraction and NLP verification
- QR code authenticity verification
- User-friendly React website with animations
- Mobile app layout and chatbot assistance
- Real-time analysis and probability score
- Secure cloud database integration

8. Results

The prototype system successfully detected inconsistencies in packaging elements with high accuracy. OCR-based text extraction showed reliable performance for label verification. Initial testing demonstrated the model's ability to differentiate between authentic and counterfeit medicines.

9. Conclusion

This AI-based solution provides an innovative, accessible, and scalable approach to combat fake medicine distribution. By integrating image analysis, machine learning, and NLP, the platform enhances public safety and supports national healthcare quality. The system offers a practical tool for consumers, pharmacists, and regulatory authorities.

10. Future Scope

- Integration with government pharmaceutical databases.
- Mobile application with offline detection.
- Real-time detection using live camera scanning.
- Expansion to detect fake cosmetics, supplements, and health products.
- Blockchain-based verification for secure supply chain management.

11. Github Profile

<https://github.com/chirumamillasanjana2005-eng/IBM.git>