LUNG CANCER PREDICTOR

A Modern Web Application for Lung Cancer Risk Assessment

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# Executive Summary

The Lung Cancer Predictor is a sophisticated web application designed to assess lung cancer risk based on user symptoms and medical history. Built with Flask and MySQL, it features a modern glassmorphism UI design and implements robust security measures. The application provides real-time risk assessment, maintains comprehensive medical histories, and ensures data integrity through advanced concurrency control mechanisms.

# Project Overview

## Purpose

The primary goal of this project is to provide an accessible and user-friendly platform for lung cancer risk assessment. The application helps users understand their risk factors and provides valuable medical recommendations based on their input.

## Key Objectives

* Provide accurate lung cancer risk assessment based on user symptoms and medical history
* Ensure secure user authentication and data protection
* Implement real-time risk score calculation
* Maintain comprehensive medical history tracking
* Offer user-friendly interface with modern design principles

# Technical Architecture

## Backend Technologies

* Python 3.12
* Flask 3.0.2
* MySQL 8.0
* Flask-Login
* Flask-Bcrypt
* PyJWT

## Frontend Technologies

* HTML5
* CSS3
* JavaScript
* Glassmorphism Design

# Features and Functionality

## User Authentication

* Secure registration and login
* Password hashing
* Session management
* JWT token support

## Risk Assessment

* Age and gender-based analysis
* Smoking status evaluation
* Symptom assessment
* Real-time risk score calculation

## Medical History

* Family history tracking
* Smoking history
* Previous lung diseases
* Occupational exposure

## Data Management

* Prediction history
* User feedback system
* Medical recommendations
* Symptom database

# Database Design

## Database Schema

**users:** User information and authentication details

**medical\_history:** Medical background and history

**predictions:** Risk assessment results

**user\_predictions:** User-prediction mapping

**symptoms:** Symptom database

**recommendations:** Medical advice and recommendations

**user\_feedback:** User feedback and ratings

## Key Database Features

* Lock Management: Only one user can make a prediction at a time
* Version Control: Prevents lost updates and supports optimistic concurrency
* Transaction Log: All changes are logged for audit and recovery
* Backup & Recovery: Daily backups and point-in-time recovery procedures
* Deadlock Detection: Automatic cleanup of expired locks

# User Interface

* Modern glassmorphism design
* Dark theme with red accents
* Responsive layout
* Interactive forms
* Real-time feedback
* Animated transitions
* Mobile-friendly design

# Security Features

* Password hashing using Flask-Bcrypt
* JWT token authentication
* SQL injection prevention
* Input validation
* Session management
* Protected routes

# Implementation Details

## Concurrency Control

The application implements a global locking mechanism to ensure that only one user can make a prediction at a time. This prevents race conditions and ensures data consistency.

## Error Handling

Comprehensive error handling is implemented throughout the application, with user-friendly error messages and proper logging of system errors.

# Future Enhancements

* Integration with medical imaging data
* Machine learning model improvements
* Mobile application development
* Integration with electronic health records
* Multi-language support
* Advanced analytics dashboard