MatriCare App Documentation

Overview

MatriCare is a comprehensive pregnancy health monitoring app that uses AI to assess maternal risks and provides guidance throughout the pregnancy journey. The app combines medical data collection, AI-powered risk assessment, and educational resources for expecting mothers.

Key Features

1. User Authentication

- **Sign Up**: New users create accounts with email and password
- **Login**: Existing users access their accounts
- **Secure Session**: User data is stored securely using DataStore

2. AI-Powered Health Assessment

- **Medical Data Collection**: Users input vital health information
- **AI Risk Analysis**: TensorFlow Lite model processes data to predict pregnancy risks
- **Risk Levels**: AI categorizes users as "No Risk", "Moderate Risk", or "High Risk"

3. Health Tracking & History

- **Historical Data**: Track health metrics over time
- **Visual Charts**: Interactive graphs showing health trends
- **Report Generation**: Comprehensive health reports with AI insights

4. Maternal Guidance

- **Diet Plans**: Trimester-specific nutrition recommendations
- **Yoga & Exercises**: Safe workouts for each pregnancy stage
- **Do's and Don'ts**: Essential pregnancy guidelines

5. AI Chatbot Assistant

- **24/7 Support**: Pregnancy-related questions answered instantly
- **Expert Knowledge**: Trained on pregnancy and maternal health topics
- **Interactive Chat**: Natural conversation interface

App Flow

1. Onboarding Process

Splash Screen → Welcome Screens (3 pages) → Get Started → Auth Choice

- Introduction to MatriCare features
- Option to skip or continue through welcome screens

2. Authentication Flow

Auth Choice → Login/Signup → Home Screen

- Users choose between login or signup
- Form validation and secure authentication
- Direct access to main features after successful login

3. Health Assessment Flow

Home → Track Health → Personal Info → Pregnancy History → AI Analysis → Report

Step 1: Personal Information

Users input 9 key health parameters:

- Age (15-49 years)
- Blood Pressure (Systolic/Diastolic)
- Blood Glucose Level
- Body Temperature
- Heart Rate
- Hemoglobin Level
- HBA1C Level
- Respiration Rate

Step 2: Pregnancy History

Users provide obstetric information:

- Gravida (G) - Total pregnancies
- Para (P) - Deliveries after 20 weeks
- Live Births (L) - Living children
- Abortions (A) - Pregnancy terminations
- Deaths (D) - Child deaths

Step 3: AI Analysis

- TensorFlow Lite model processes 14 data points
- Real-time risk assessment
- Generates prediction with confidence score

Step 4: Report Generation

- Comprehensive health report
- AI risk assessment results
- Visual health metrics
- Automatic save to user's history

4. Main Dashboard (Home Screen)

Central hub with quick access to:

- Health tracking
- Maternal guide
- Report history
- AI chatbot
- Wellness programs

5. Health History Flow

Home → Report History → Chart Views → Detailed Records

- Two main sections: Prediction History and Risk History
- Interactive charts for different health parameters
- Historical trend analysis

Technical Architecture

Data Storage

- **Firebase Firestore**: Cloud database for user data and medical records
- **Firebase Authentication**: Secure user management
- **DataStore**: Local session management

AI/ML Integration

- **TensorFlow Lite**: On-device AI model for risk prediction
- **14-Feature Model**: Processes medical and obstetric data
- **Real-time Analysis**: Instant risk assessment

API Integration

- **Chatbot API**: Cloud-based pregnancy knowledge system
- **Real-time Responses**: Instant answers to pregnancy questions

UI/UX Framework

- **Jetpack Compose**: Modern Android UI framework
- **Material Design 3**: Contemporary design system
- **Real-time Validation**: Live form validation during data entry

Data Validation & Safety

Input Validation

- Real-time validation for all health parameters
- Medical range checking (e.g., Blood pressure 70-200/40-120 mmHg)
- Relationship validation (e.g., Systolic > Diastolic)

Data Security

- Encrypted data transmission
- Secure Firebase authentication
- Local session management with DataStore

Medical Accuracy

- Validation based on medical research standards
- Age restrictions (15-49 years) for pregnancy relevance
- Obstetric history logical validation

User Interface Highlights

Modern Design

- Pink accent color (#E91E63) for MatriCare branding
- Clean, minimal interface
- Intuitive navigation

Accessibility Features

- Large, readable fonts
- High contrast colors

- Clear visual indicators for form validation

Interactive Elements

- Real-time form validation with visual feedback
- Progress indicators for multi-step processes
- Interactive charts and graphs

Key Screens Description

Home Screen

- Personalized greeting
- Quick access cards for main features
- Health tracking prominent call-to-action

Health Assessment Screens

- Two-step process with progress indicators
- Real-time validation with error messaging
- Clear medical terminology explanations

Report Analysis Screen

- AI prediction prominently displayed
- Detailed health metrics breakdown
- Visual progress indicators for health parameters

Maternal Guide

- Three main categories: Diet, Yoga, Do's & Don'ts
- Trimester-specific recommendations
- Educational content with visual icons

Chatbot Interface

- Chat-like interface for natural interaction
- Suggested topics for quick questions
- Real-time typing indicators

Data Models

User Information

- Personal details and authentication
- Medical history records
- Session management

Medical Data

- 9 personal health parameters
- 5 obstetric history parameters
- Timestamps and versioning

AI Predictions

- Risk level classification
- Confidence scores
- Prediction timestamps

Development Approach

MVVM Architecture

- ViewModels for business logic
- Repository pattern for data management
- LiveData and StateFlow for reactive UI

Modular Design

- Separate modules for different features
- Reusable UI components
- Clean separation of concerns

Error Handling

- Comprehensive validation
- User-friendly error messages
- Graceful failure handling

Future Enhancements

Potential Features

- Doctor consultation scheduling
- Medication reminders
- Hospital finder

- Emergency contact integration
- Multilingual support

Technical Improvements

- Offline mode capability
- Enhanced AI model accuracy
- Push notifications for health tracking
- Data export functionality