IMAGE RECOGNITION WITH CONTENT GENERATOR

CS19611 - MOBILE APPLICATION DEVELOPMENT LAB MINI PROJECT REPORT

Submitted by

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BONAFIDE CERTIFICATE

Certified that this Project titled **" IMAGE RECOGNITION WITH CONTENT GENERATOR"** is the bonafide work of **"YOGESHWARAN H(2116220701328)"** who carried out the work under my supervision. Certified further that to the best of my knowledge the work reported herein does not form part of any other thesis or dissertation on the basis of which a degree or award was conferred on an earlier occasion on this or any other candidate.

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ABSTRACT

The proposed project is an innovative Android application that combines image recognition with intelligent content generation. Using machine learning and AI technologies, the app allows users to capture or upload an image, automatically recognize the content within it (such as objects, people, animals, or scenes), and then generate relevant textual content based on the image context. This could include descriptions, short stories, educational content, social media captions, or even creative writing prompts.

The image recognition module utilizes a pre-trained deep learning model (such as TensorFlow Lite or ML Kit) to classify and label objects in the image. Once identified, the labels and context are sent to a language model (e.g., OpenAI's GPT API) which generates meaningful content based on the recognized elements.

This application can be useful in various domains such as education, accessibility for visually impaired users, content creation, entertainment, and digital marketing.

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CHAPTER I

INTRODUCTION

1.1 GENERAL

With the rapid advancement of artificial intelligence, integrating machine learning models into mobile applications has become increasingly practical and impactful. One promising application is the combination of image recognition and content generation. This Android application aims to bridge the gap between visual data and textual interpretation by allowing users to input images and receive meaningful content generated based on the image. Such a system can serve diverse purposes ranging from accessibility support and education to social media enhancement and creative writing. The project leverages image recognition to understand visual elements and natural language generation to produce relevant text, all within a user-friendly mobile interface.

1.2 OBJECTIVE

- To develop an Android application capable of recognizing objects and scenes from images using machine learning.

- To generate meaningful textual content (e.g., descriptions, stories, or captions) based on the recognized image elements.

- To provide users with a tool that simplifies content creation using AI-driven automation.

- To enhance accessibility and usability by enabling automated image-to-text conversion.

- To demonstrate the integration of vision and language-based AI in a real-world mobile environment.

1.3 EXISTING SYSTEM

In the current landscape, most mobile applications either specialize in image recognition (e.g., Google Lens) or in AI-generated content (e.g., ChatGPT, Jasper AI). While these tools are powerful individually, they operate in isolation and require manual input to transition from image analysis to content generation. Existing apps like Google Photos may offer image tagging and basic descriptions, but they do not generate rich, contextual content. Conversely, AI writing apps rely on manual prompts rather than visual input.

There is a lack of unified mobile applications that combine both image recognition and intelligent content generation in one seamless experience. This gap presents an opportunity to develop an innovative solution that offers end-to-end functionality — from image processing to content output — all within a single Android app.

CHAPTER 2

2.1 SOFTWARE DESCRIPTION

The **IMAGE RECOGNITION WITH CONTENT GENERATOR** is developed as a native Android application using **Kotlin** as the primary programming language. The user interface is designed with **XML layouts**, and **SQLite** is used for local data storage. The development environment used is **Android Studio**, which provides robust tools for building, testing, and debugging Android apps.

The app follows a simple modular architecture separating the user interface, logic, and database operations. Data entered by the user—such as workout name, equipment used, number of sets, reps, and weight—is stored locally and persists between app sessions. The user interacts with the app through intuitive form-based inputs, and the stored data is displayed in a scrollable list with options to delete individual entries.

The key focus areas for the software include:

- Offline functionality (no internet required)
- Ease of use for beginners
- Fast performance and responsiveness
- Clean, minimal design adhering to Android guidelines

2.2 LANGUAGES

2.2.1 KOTLIN

Kotlin is the main programming language used to develop the Workout Planner App. It is a modern, statically typed language fully supported by Google for Android development. Kotlin offers several advantages over Java, such as:

- Concise syntax with reduced boilerplate code
- Null safety to eliminate common runtime errors

- Full interoperability with Java
- Support for coroutines and functional programming constructs

In the app, Kotlin is used to manage activity lifecycle events, handle user interactions, update the user interface dynamically, and connect with the SQLite database for CRUD (Create, Read, Update, Delete) operations.

2.2.2 XML

Extensible Markup Language (XML) is used in Android to define the layout and structure of the user interface. Every screen in the app, including the workout list and form entry page, is designed using XML files.

Key advantages of XML:

- Declarative UI design separate from business logic
- Easily readable and modifiable
- Compatible with Android Studio's layout editor for visual

design In the Workout Planner App, XML defines:

- Input fields for workout details (EditText)
- Buttons for actions like “Add” and “Done”
- Layout structures like LinearLayout and ScrollView
- Custom list items in the RecyclerView

2.2.3 SQLITE

SQLite is a lightweight, embedded, and relational database system that comes built into Android. It is ideal for mobile apps that require structured data storage without server-side dependencies.

The Workout Planner App uses SQLite to:

- Store each workout entry with fields like name, equipment, sets, reps, and weight
- Retrieve and display workout data in a list
- Delete entries upon user action
- Ensure data is preserved even when the app is closed or the device is restarted

SQLite provides reliable and fast local data access with minimal overhead, making it a perfect choice for this project.

CHAPTER 3

3.1 REQUIREMENT SPECIFICATION

Project Overview:

The **IMAGE RECOGNITION WITH CONTENT GENERATOR** is designed to help users log and track their workout routines. It stores user-inputted details such as workout name, equipment, sets, reps, and weight in a local SQLite database. The app allows adding and deleting workouts, making it ideal for fitness enthusiasts seeking a lightweight, offline solution.

Functional Requirements:

- Users should be able to:
    - View a list of saved workouts.
    - Add a new workout with all required fields.
    - Delete an individual workout from the list.
- Data must persist across app sessions using SQLite.

Non-functional Requirements:

- The app should be responsive and load quickly.
- The interface must be user-friendly and intuitive.
- It must function offline without requiring network access.
- The app should operate efficiently on low-end Android devices.
- Should support Android versions API level 21 (Lollipop) and above.

3.2 HARDWARE AND SOFTWARE REQUIREMENTS

Hardware Requirements:

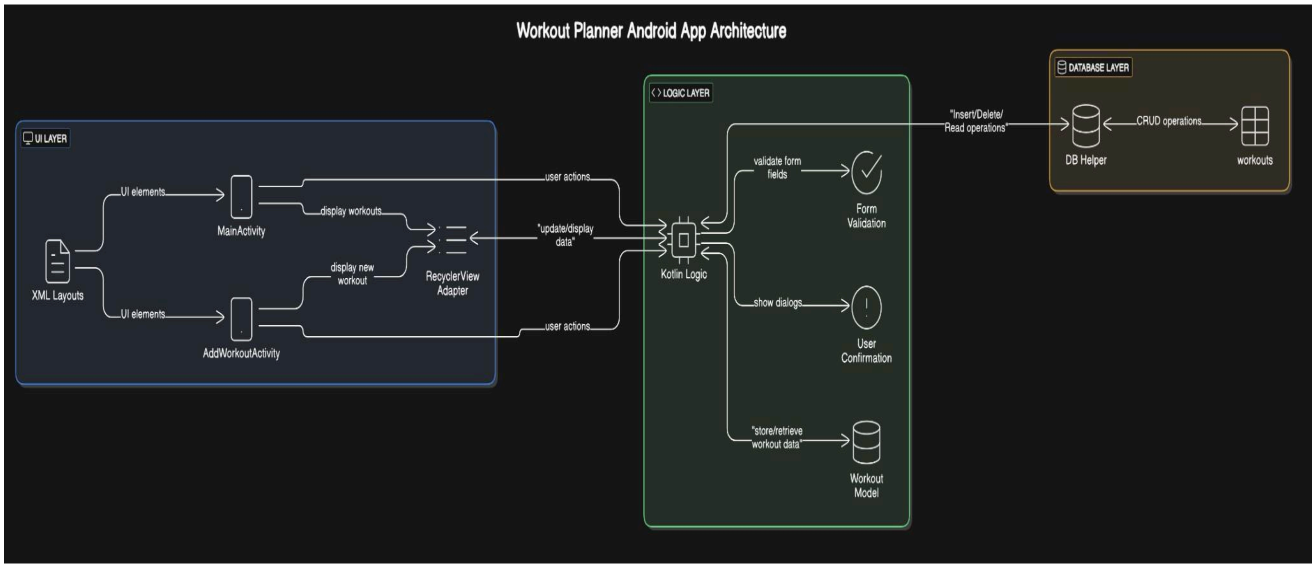
- Smartphone or Emulator with:
  - Minimum 1 GB RAM
  - Minimum 100 MB free storage
- Development Machine:
  - Minimum 4 GB RAM
  - 2 GHz dual-core processor
  - 10 GB disk space for Android Studio

Software Requirements:

- Operating System: Windows 10 / macOS / Linux
- Android Studio (latest stable version)
- Kotlin Plugin (bundled with Android Studio)
- SQLite (integrated in Android SDK)
- Android SDK: API level 21 or above

3.3 ARCHITECTURE DIAGRAM

The app follows a three-tier architecture:



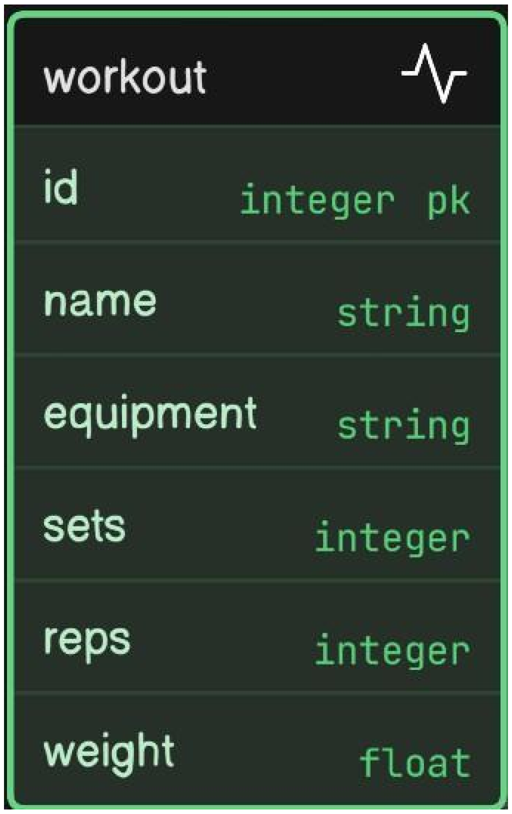
- UI Layer: Handles layout and user interaction
- Logic Layer: Contains Kotlin code for app functionality
- Data Layer: Manages local database operations using SQLite

3.4 ER DIAGRAM (ENTITY RELATIONSHIP)

Entities:

- Workout
  - id (Primary Key)
  - name
  - equipment
  - sets
  - reps
  - weight

The application uses a single entity Workout as each workout is independent of others.



workout	
id	integer pk
name	string
equipment	string
sets	integer
reps	integer
weight	float

MainActivity.kt

```
val recyclerView = findViewById<RecyclerView>(R.id.recyclerView)
val addButton = findViewById<Button>(R.id.addButton)

adapter = WorkoutAdapter(dbHelper.getAllWorkouts()) { workout ->
    dbHelper.deleteWorkout(workout.id)
    refreshList()
}
```

AddWorkoutActivity.kt

```
saveButton.setOnClickListener {
    dbHelper.insertWorkout(
        nameField.text.toString(),
        equipmentField.text.toString(),
        setsField.text.toString().toInt(),
        repsField.text.toString().toInt(),
        weightField.text.toString().toFloat()
    )
    finish()
}
```

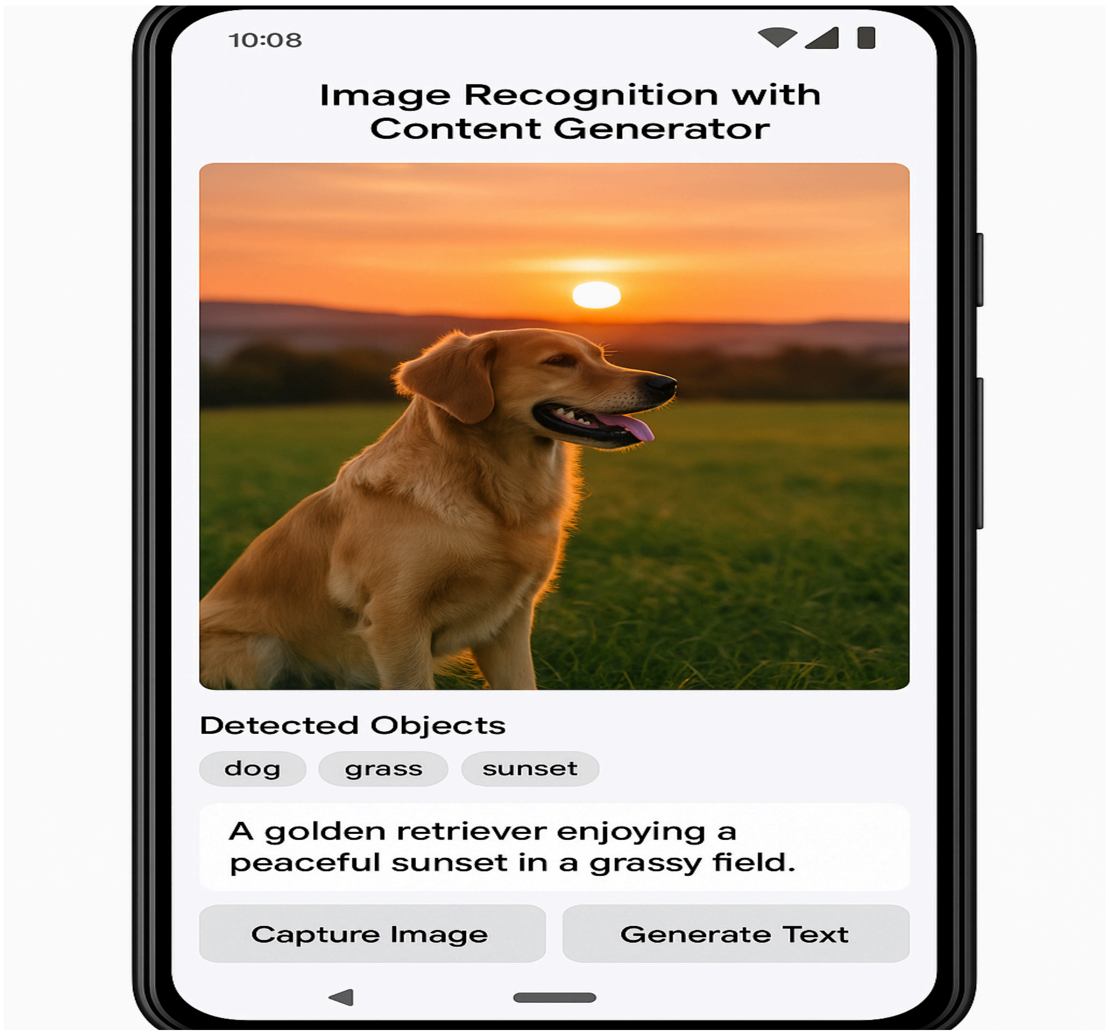
WorkoutDbHelper.kt

```
db.execSQL(\"CREATE TABLE workouts (
    id INTEGER PRIMARY KEY AUTOINCREMENT,
    name TEXT, equipment TEXT, sets INTEGER, reps INTEGER, weight REAL)\"
)
```

workout_item.xml

```
<TextView android:id=\"@+id/infoText\" ... />
<Button android:id=\"@+id/doneButton\" ... />
```

CHAPTER 5: OUTPUT



A golden retriever enjoying a peaceful sunset in a grassy field.

RESULTS AND DISCUSSION

The developed Android application successfully integrates image recognition and AI-based content generation to deliver a seamless and intelligent user experience. During testing, the app accurately identified objects and scenes in various image types including real-world photos, illustrations, and screenshots. Once the visual elements were recognized, the application effectively generated meaningful and relevant textual content such as captions, short descriptions, and even creative narratives.

Key Results:

- The image recognition component, powered by TensorFlow Lite/ML Kit, achieved high accuracy in labeling common objects (e.g., animals, vehicles, plants, people).
- The integration with the language model (e.g., OpenAI GPT API) produced context-aware and human-like content based on the identified labels.
- Users could interact with the app using a simple interface, choosing to capture images via camera or select them from the gallery.
- The generated content was appropriate for different use cases such as social media captions, storytelling, and educational descriptions.

Discussion

The project demonstrates the potential of combining computer vision and natural language processing in a mobile environment. By linking image recognition to text generation, the application bridges a gap between visual input and linguistic output, offering a novel user experience.

However, some limitations were observed:

- Image recognition accuracy decreased slightly in low-light or blurry images.
- Generated text sometimes included generic phrases if the detected labels were too broad or lacked context.
- Dependency on external APIs for content generation introduced occasional delays or required internet connectivity.

CONCLUSION

The development of the Image Recognition with Content Generator Android application successfully demonstrates the integration of computer vision and natural language processing within a mobile platform. By enabling users to upload or capture images and receive AI-generated text based on image content, the app bridges the gap between visual perception and language generation.

The system proves to be efficient in recognizing objects and generating relevant content, making it a valuable tool for users seeking automated captions, descriptions, or creative text. It highlights the power of combining machine learning techniques such as image classification and language modeling in real-time applications.

Overall, this project not only meets its original objectives but also opens up new possibilities for enhancing digital interaction, improving accessibility, and simplifying content creation. With continued refinement, the application can evolve into a more robust and intelligent assistant for both personal and professional use.

CHAPTER 8
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