Android Application Development

MainActivity.java

```java
package com.example.computervision;

import android.app.Activity;
import android.content.Intent;
import android.graphics.Bitmap;
import android.os.Bundle;
import android.provider.MediaStore;
import android.widget.Button;
import android.widget.ImageView;
import android.widget.Toast;

import androidx.activity.result.ActivityResultLauncher;
import androidx.activity.result.contract.ActivityResultContracts;
import androidx.appcompat.app.AppCompatActivity;
import androidx.recyclerview.widget.LinearLayoutManager;
import androidx.recyclerview.widget.RecyclerView;

import com.android.volley.Request;
import com.android.volley.RequestQueue;
import com.android.volley.Response;
import com.android.volley.VolleyError;
import com.android.volley.toolbox.JsonObjectRequest;
import com.android.volley.toolbox.Volley;
import com.google.mlkit.vision.common.InputImage;
import com.google.mlkit.vision.label.ImageLabeler;
import com.google.mlkit.vision.label.ImageLabeling;
import com.google.mlkit.vision.label.defaults.ImageLabelerOptions;

import org.json.JSONArray;
import org.json.JSONException;
import org.json.JSONObject;

import java.util.ArrayList;

public class MainActivity extends AppCompatActivity {

    // variables for our image view, image bitmap,
    // buttons, recycler view, adapter and array list.
    private ImageView img;
    private Button snap, searchResultsBtn;
    private Bitmap imageBitmap;
    private RecyclerView resultRV;
```

```java
private SearchResultsRVAdapter searchResultsRVAdapter;
private ArrayList<dataModal> dataModalArrayList;
private String title, link, displayed_link, snippet;
ActivityResultLauncher<Intent> takeImageLauncher;

@Override
protected void onCreate(Bundle savedInstanceState) {
    super.onCreate(savedInstanceState);
    setContentView(R.layout.activity_main);

    // initializing all our variables for views
    img = findViewById(R.id.image);
    snap = findViewById(R.id.snapbtn);
    searchResultsBtn = findViewById(R.id.idBtnSearchResuts);
    resultRV = findViewById(R.id.idRVSearchResults);

    // initializing our array list
    dataModalArrayList = new ArrayList<>();

    // initializing our adapter class.
    searchResultsRVAdapter = new SearchResultsRVAdapter(dataModalArrayList, MainActivity.this);

    // adding on click listener for our snap button.
    snap.setOnClickListener(v -> {
        // calling a method to capture an image.
        dispatchTakePictureIntent();
    });

    // adding on click listener for our button to search data.
    searchResultsBtn.setOnClickListener(v -> {
        // calling a method to get search results.
        getResults();
    });

    // Variable to initiate camera and take a snap
    takeImageLauncher = registerForActivityResult(
            new ActivityResultContracts.StartActivityForResult(),
            o -> {
                if (o.getResultCode() == Activity.RESULT_OK) {
                    Intent data = o.getData();
                    Bundle extras = data.getExtras();
                    imageBitmap = (Bitmap) extras.get("data");
                    img.setImageBitmap(imageBitmap);
                }
            }
    );
}
```

```java
    private void getResults() {
        // We will be using the Google's ML library to get a label of the image
        // The label will be any describing word about the image you took.
        dataModalArrayList.clear();

        InputImage image = InputImage.fromBitmap(imageBitmap, 0);

        ImageLabeler labeler = ImageLabeling.getClient(ImageLabelerOptions.DEFAULT_OPTIONS);

        labeler.process(image)
            .addOnSuccessListener(labels -> {
                // Task completed successfully
                String searchQuery = labels.get(0).getText();
                searchData(searchQuery);
            })
            .addOnFailureListener(e -> {
                // Task failed with an exception
                Toast.makeText(MainActivity.this, "Fail to detect image..", Toast.LENGTH_SHORT).show();
            });
    }

    private void searchData(String searchQuery) {
        // Creating a URL to call the API
        String apiKey = "YOUR_API_KEY";
        String url = "https://serpapi.com/search.json?q=" + searchQuery.trim() +
"&location=Delhi,India&hl=en&gl=us&google_domain=google.com&api_key=" + apiKey;
        System.out.println(searchQuery.trim());
        // creating a new variable for our request queue
        RequestQueue queue = Volley.newRequestQueue(MainActivity.this);
        JsonObjectRequest jsonObjectRequest = new JsonObjectRequest(Request.Method.GET, url, null,
new Response.Listener<JSONObject>() {
            @Override
            public void onResponse(JSONObject response) {
                try {
                    // on below line we are extracting data from our json.
                    JSONArray organicResultsArray = response.getJSONArray("organic_results");
                    for (int i = 0; i < organicResultsArray.length(); i++) {
                        JSONObject organicObj = organicResultsArray.getJSONObject(i);
                        if (organicObj.has("title")) {
                            title = organicObj.getString("title");
                        }
                        if (organicObj.has("link")) {
                            link = organicObj.getString("link");
                        }
                        if (organicObj.has("displayed_link")) {
                            displayed_link = organicObj.getString("displayed_link");
                        }
                        if (organicObj.has("snippet")) {
```

```java
                snippet = organicObj.getString("snippet");
            }
            // on below line we are adding data to our array list.
            dataModalArrayList.add(new dataModal(title, link, displayed_link, snippet));
        }
        // notifying our adapter class
        // on data change in array list.
        //searchResultsRVAdapter.notifyDataSetChanged();

        // layout manager for our recycler view.
        LinearLayoutManager manager = new LinearLayoutManager(MainActivity.this,
LinearLayoutManager.HORIZONTAL, false);

        // on below line we are setting layout manager
        // and adapter to our recycler view.
        resultRV.setLayoutManager(manager);
        resultRV.setAdapter(searchResultsRVAdapter);

    } catch (JSONException e) {
        System.out.println(e);
    }
    }
    }, new Response.ErrorListener() {
        @Override
        public void onErrorResponse(VolleyError error) {
            // displaying error message.
            System.out.println(error.toString());
            Toast.makeText(MainActivity.this, "No Result found for the search query..",
Toast.LENGTH_SHORT).show();
        }
    });
    // adding json object request to our queue.
    queue.add(jsonObjectRequest);
  }

  // method to capture image.
  private void dispatchTakePictureIntent() {
    // inside this method we are calling an implicit intent to capture an image.
    Intent takePictureIntent = new Intent(MediaStore.ACTION_IMAGE_CAPTURE);
    if (takePictureIntent.resolveActivity(getPackageManager()) != null) {
      takeImageLauncher.launch(takePictureIntent);
    }
  }
}
```

Android Manifest.xml

```xml
<?xml version="1.0" encoding="utf-8"?>
<manifest xmlns:android="http://schemas.android.com/apk/res/android"
    package="com.example.computervision">

    <uses-permission android:name="android.permission.READ_EXTERNAL_STORAGE" />

    <application
        android:allowBackup="true"
        android:icon="@mipmap/ic_launcher"
        android:label="@string/app_name"
        android:roundIcon="@mipmap/ic_launcher_round"
        android:supportsRtl="true"
        android:theme="@style/Theme.AppCompat.Light.NoActionBar">
        <activity
            android:name=".SearchResultsRVAdapter"
            android:exported="false" />
        <activity
            android:name=".ObjectDetectionActivity"
            android:exported="false" />
        <activity
            android:name=".MainActivity"
            android:exported="true"> <!-- Set to true for launcher activity -->
            <intent-filter>
                <action android:name="android.intent.action.MAIN" />

                <category android:name="android.intent.category.LAUNCHER" />
            </intent-filter>
        </activity>
        <activity
            android:name=".NumberPlateDetectionActivity"
            android:exported="false"> <!-- Set to false if not exported -->
        </activity>
        <activity
            android:name=".CurrencyConverterActivity"
            android:exported="false"> <!-- Set to false if not exported -->
        </activity>
    </application>

</manifest>
```

Activity_main.xml

```xml
<?xml version="1.0" encoding="utf-8"?>
<RelativeLayout
    xmlns:android="http://schemas.android.com/apk/res/android"
    xmlns:tools="http://schemas.android.com/tools"
```

```xml
    android:layout_width="match_parent"
    android:layout_height="match_parent"
    tools:context=".MainActivity">

    <!--image view for displaying our image-->
    <ImageView
        android:id="@+id/image"
        android:layout_width="match_parent"
        android:layout_height="300dp"
        android:layout_alignParentTop="true"
        android:layout_centerHorizontal="true"
        android:layout_marginTop="10dp"
        android:scaleType="centerCrop" />

    <LinearLayout
        android:id="@+id/idLLButtons"
        android:layout_width="match_parent"
        android:layout_height="wrap_content"
        android:layout_below="@id/image"
        android:orientation="horizontal">

        <!--button for capturing our image-->
        <Button
            android:id="@+id/snapbtn"
            android:layout_width="0dp"
            android:layout_height="wrap_content"
            android:layout_gravity="center"
            android:layout_margin="5dp"
            android:layout_marginTop="30dp"
            android:layout_weight="1"
            android:lines="2"
            android:text="Snap"
            android:textAllCaps="false"
            android:textSize="18sp"
            android:textStyle="bold" />

        <!--button for detecting the objects-->
        <Button
            android:id="@+id/idBtnSearchResuts"
            android:layout_width="0dp"
            android:layout_height="wrap_content"
            android:layout_gravity="center"
            android:layout_margin="5dp"
            android:layout_marginTop="30dp"
            android:layout_weight="1"
            android:lines="2"
            android:text="Get Search Results"
            android:textAllCaps="false"
```

```
            android:textSize="18sp"
            android:textStyle="bold" />

    </LinearLayout>

    <!--recycler view for displaying the list of result-->
    <androidx.recyclerview.widget.RecyclerView
        android:id="@+id/idRVSearchResults"
        android:layout_width="match_parent"
        android:layout_height="wrap_content"
        android:layout_below="@id/idLLButtons" />

</RelativeLayout>
```

CurrencyConverter.java

```java
package com.example.computervision;

import android.os.Bundle;
import android.view.View;
import android.widget.Button;
import android.widget.EditText;
import android.widget.TextView;
import android.widget.Toast;
import androidx.appcompat.app.AppCompatActivity;

public class CurrencyConverterActivity extends AppCompatActivity {

    private EditText inputAmount;        // ID: input_amount
    private TextView convertedAmount;    // ID: converted_amount
    private Button convertButton;        // ID: convert_button

    private static final double CONVERSION_RATE = 82.3; // Fixed conversion rate from USD to INR

    @Override
    protected void onCreate(Bundle savedInstanceState) {
        super.onCreate(savedInstanceState);
        setContentView(R.layout.activity_currency_converter);

        // Reference the views by ID
        inputAmount = findViewById(R.id.input_amount);  // Match this ID
        convertedAmount = findViewById(R.id.converted_amount);  // Match this ID
        convertButton = findViewById(R.id.convert_button);  // Match this ID

        convertButton.setOnClickListener(new View.OnClickListener() {
            @Override
            public void onClick(View v) {
                String amountStr = inputAmount.getText().toString();
```

```java
            if (!amountStr.isEmpty()) {
                double amount = Double.parseDouble(amountStr);
                convertCurrency(amount);
            } else {
                Toast.makeText(CurrencyConverterActivity.this, "Please enter an amount in USD",
Toast.LENGTH_SHORT).show();
            }
        }
    });
}

private void convertCurrency(double amount) {
    // Calculate the converted amount using the fixed conversion rate
    double convertedValue = amount * CONVERSION_RATE;

    // Update the converted amount TextView
    convertedAmount.setText(String.format("Converted Amount: %.2f INR", convertedValue));
    }
}
```

Currency_activity.xml

```xml
<?xml version="1.0" encoding="utf-8"?>
<RelativeLayout xmlns:android="http://schemas.android.com/apk/res/android"
    xmlns:app="http://schemas.android.com/apk/res-auto"
    android:layout_width="match_parent"
    android:layout_height="match_parent"
    android:padding="16dp">

    <EditText
        android:id="@+id/input_amount"
    android:layout_width="match_parent"
    android:layout_height="wrap_content"
    android:hint="Enter amount in USD"
    android:inputType="numberDecimal" />

    <TextView
        android:id="@+id/converted_amount"
    android:layout_width="wrap_content"
    android:layout_height="wrap_content"
    android:text="Converted Amount: 0 INR"
    android:textSize="18sp"
    android:layout_below="@id/input_amount"
    android:layout_marginTop="16dp" />

    <Button
        android:id="@+id/convert_button"
    android:layout_width="wrap_content"
    android:layout_height="wrap_content"
```

```xml
        android:text="Convert"
        android:layout_below="@id/converted_amount"
        android:layout_marginTop="16dp" />
</RelativeLayout>
```

NumberplateActivity.java

```java
package com.example.computervision;

import android.content.Intent;
import android.net.Uri;
import android.os.Bundle;
import android.provider.MediaStore;
import android.widget.ImageView;
import android.widget.TextView;
import android.widget.Toast;

import androidx.annotation.Nullable;
import androidx.appcompat.app.AppCompatActivity;

import com.google.android.gms.tasks.OnFailureListener;
import com.google.android.gms.tasks.OnSuccessListener;
import com.google.mlkit.vision.common.InputImage;
import com.google.mlkit.vision.text.Text;
import com.google.mlkit.vision.text.TextRecognition;
import com.google.mlkit.vision.text.TextRecognizer;
import com.google.mlkit.vision.text.latin.TextRecognizerOptions;

public class NumberPlateDetectionActivity extends AppCompatActivity {

    private static final int PICK_IMAGE_REQUEST = 1; // Request code for selecting an image

    private ImageView imageView;
    private TextView resultTextView;
    private Uri imageUri; // To store selected image URI

    @Override
    protected void onCreate(Bundle savedInstanceState) {
        super.onCreate(savedInstanceState);
        setContentView(R.layout.activity_number_plate_detection);

        imageView = findViewById(R.id.numberPlateImageView);
        resultTextView = findViewById(R.id.resultTextView);

        // Trigger image selection
        selectImageFromGallery();
    }

    // Method to open the image gallery
```

```java
    private void selectImageFromGallery() {
        Intent intent = new Intent(Intent.ACTION_PICK,
MediaStore.Images.Media.EXTERNAL_CONTENT_URI);
        startActivityForResult(intent, PICK_IMAGE_REQUEST); // Start the gallery intent
    }

    // Handle the result when the user picks an image
    @Override
    protected void onActivityResult(int requestCode, int resultCode, @Nullable Intent data) {
        super.onActivityResult(requestCode, resultCode, data);

        if (requestCode == PICK_IMAGE_REQUEST && resultCode == RESULT_OK && data != null &&
data.getData() != null) {
            imageUri = data.getData(); // Get the URI of the selected image
            imageView.setImageURI(imageUri); // Display the image in the ImageView
            processImage(imageUri); // Process the image for text recognition
        } else {
            Toast.makeText(this, "No image selected", Toast.LENGTH_SHORT).show();
        }
    }

    // Method to process the selected image
    private void processImage(Uri imageUri) {
        try {
            InputImage image = InputImage.fromFilePath(this, imageUri);
            TextRecognizer recognizer =
TextRecognition.getClient(TextRecognizerOptions.DEFAULT_OPTIONS);
            //https://serpapi.com/search.json?engine=google_lens&url=https://i.imgur.com/HBrB8p0.png

            recognizer.process(image)
                .addOnSuccessListener(new OnSuccessListener<Text>() {
                    @Override
                    public void onSuccess(Text result) {
                        String recognizedText = result.getText();
                        resultTextView.setText("Detected text: " + recognizedText);
                    }
                })
                .addOnFailureListener(new OnFailureListener() {
                    @Override
                    public void onFailure(Exception e) {
                        Toast.makeText(NumberPlateDetectionActivity.this, "Error: " + e.getMessage(),
Toast.LENGTH_SHORT).show();
                    }
                });
        } catch (Exception e) {
            Toast.makeText(this, "Error processing image: " + e.getMessage(),
Toast.LENGTH_SHORT).show();
        }
```
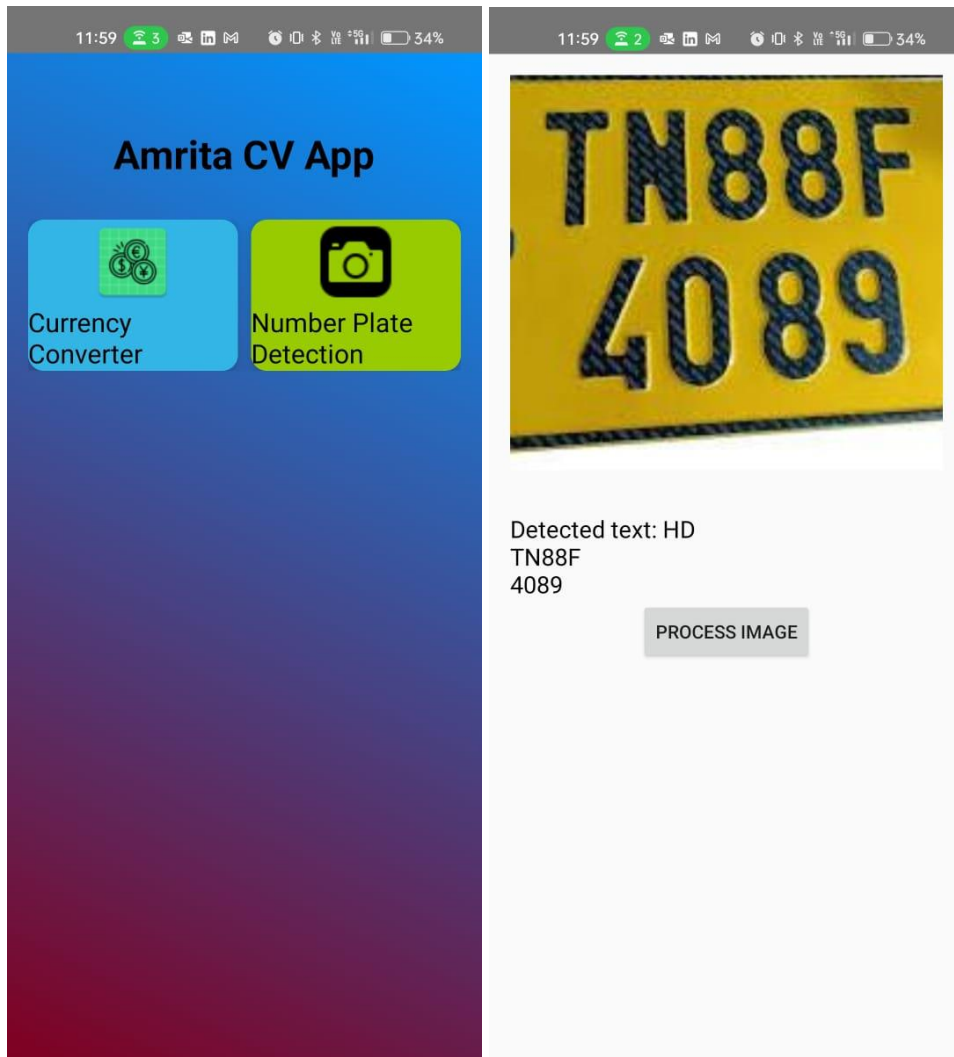
```
    }
}
```

NumberplateActivity.xml

```xml
<?xml version="1.0" encoding="utf-8"?>
<RelativeLayout xmlns:android="http://schemas.android.com/apk/res/android"
    android:layout_width="match_parent"
    android:layout_height="match_parent"
    android:padding="16dp">

    <ImageView
        android:id="@+id/numberPlateImageView"
        android:layout_width="match_parent"
        android:layout_height="300dp"
        android:scaleType="centerCrop"
        android:layout_marginBottom="16dp" />

    <TextView
        android:id="@+id/resultTextView"
        android:layout_width="match_parent"
        android:layout_height="wrap_content"
        android:text="Detected text will appear here"
        android:textSize="18sp"
        android:layout_below="@id/numberPlateImageView"
        android:layout_marginTop="16dp"
        android:textColor="@android:color/black"/>

    <Button
        android:id="@+id/processButton"
        android:layout_width="wrap_content"
        android:layout_height="wrap_content"
        android:text="Process Image"
        android:layout_centerHorizontal="true"
        android:layout_below="@id/resultTextView" />

</RelativeLayout>
```

Outputs and Screen shots

Done by:
N Aruntej