PRACTICAL 1

AIM: Introduction to Android and Create “Custom Message” application. That will display “Custom Message” in the middle of the screen in the Black color with the Yellow background.

CODE:

// CustomMessage.java

```
package com.example.a17it043_wcmc;

import android.os.Bundle;
import android.support.v7.app.AppCompatActivity;

public class customMessage extends AppCompatActivity {

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

// activity_main.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"
    xmlns:tools="http://schemas.android.com/tools"
    android:id="@+id/coordinatorLayout"
    android:layout_width="match_parent"
    android:layout_height="match_parent"
    android:background="#FFEB3B"
    tools:context=".customMessage">

    <TextView
        android:layout_width="wrap_content"
        android:layout_height="wrap_content"
        android:layout_centerInParent="true"
        android:layout_marginTop="300dp"
        android:text="Hello World !"
        android:textAllCaps="false"
        android:textColor="#000000"
        android:textSize="36sp"
        app:fontFamily="sans-serif-condensed-medium" />

</RelativeLayout>
```

OUTPUT:

Basically This is a basic application which contain a string “Hello World” and background colour is yellow.

LEARNING OUTCOME:

We learn Basic about android studio and make a simple application using this.

PRACTICAL 2

AIM: Create an android application to calculate sum of two numbers and gives result in Toast Message.

CODE:

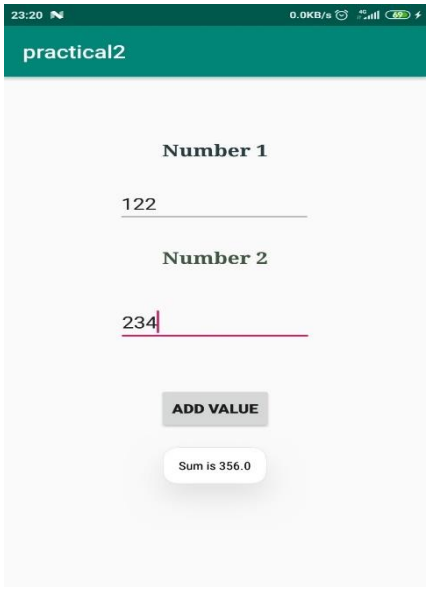
// Sum.java

```
package com.example.a17it043_wcmc_prac_2;

import android.os.Bundle;
import android.support.v7.app.AppCompatActivity;
import android.widget.EditText;
import android.text.TextUtils;
import android.view.View;
import android.widget.Button;
import android.widget.EditText;
import android.widget.Toast;

public class sum extends AppCompatActivity {

   EditText mNum1, mNum2;
   Button mAdd;
   float num1, num2, sum;

      protected void onCreate (Bundle savedInstanceState){
         super.onCreate(savedInstanceState);
         setContentView(R.layout.activity_sum);

         mNum1 = findViewById(R.id.num1Et);
         mNum2 = findViewById(R.id.num2Et);
         mAdd = findViewById(R.id.addBtn);

         mAdd.setOnClickListener(new View.OnClickListener() {
            @Override
            public void onClick(View v) {
               if (TextUtils.isEmpty(mNum1.getText().toString()) &&
                     TextUtils.isEmpty(mNum2.getText().toString())) {
                  Toast.makeText(sum.this, "Please enter number...",
Toast.LENGTH_SHORT).show();
               } else {
                  num1 = Float.parseFloat(mNum1.getText().toString().trim());
                  num2 = Float.parseFloat(mNum2.getText().toString().trim());
                  sum = num1 + num2;
                  Toast.makeText(sum.this, "Sum = " + sum, Toast.LENGTH_SHORT).show();
               }
            }
         });
      }
   }
```

activity_main.xml

```
<?xml version="1.0" encoding="utf-8"?>
<LinearLayout xmlns:android="http://schemas.android.com/apk/res/android"
   xmlns:app="http://schemas.android.com/apk/res-auto"
   xmlns:tools="http://schemas.android.com/tools"
   android:layout_width="match_parent"
   android:layout_height="match_parent"
   android:orientation="vertical"
   tools:context=".sum">

   <EditText
      android:id="@+id/num1Et"
      android:layout_width="match_parent"
      android:layout_height="wrap_content"
      android:layout_marginBottom="10dp"
      android:layout_marginLeft="10dp"
      android:layout_marginRight="10dp"
      android:layout_marginTop="100dp"
      android:hint="Enter Number 1"
      android:inputType="numberDecimal"
      android:textSize="20sp" />


   <EditText
      android:id="@+id/num2Et"
      android:layout_width="match_parent"
      android:layout_height="wrap_content"
      android:layout_margin="10dp"
      android:hint="Enter Number 2"
      android:inputType="numberDecimal"
      android:textSize="20sp" />

   <Button
      android:id="@+id/addBtn"
      android:layout_width="match_parent"
      android:layout_height="wrap_content"
      android:layout_marginLeft="120dp"
      android:layout_marginRight="120dp"
      android:background="#fff111"
      android:text="ADD"
      android:textSize="18sp"
      android:layout_marginTop="25dp"
      android:textColor="#111" />

</LinearLayout>
```

OUTPUT:



So In This application when we enter two numbers in text field and then after click on submit button it will shows the addition of two numbers as a toast message.

LEARNING OUTCOME:

In this practical we learn how to display toast message in application and also how to use button and edittext.

PRACTICAL 3

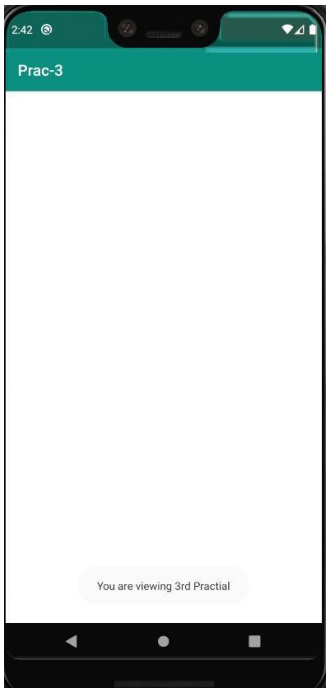
AIM: Create an application that will display Toast (Message) on specific interval of time.

CODE:

```
// MainActivity.java

package com.example.a17it043_wcmc_prac_3;

import android.os.Bundle;
import android.support.v7.app.AppCompatActivity;
import android.widget.Chronometer;
import android.widget.TextView;
import android.widget.Toast;

public class MainActivity extends AppCompatActivity {
   Chronometer c;
   int i=0;
   int duration=10;
   TextView tv;

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

      c=(Chronometer)findViewById(R.id.mcc);
      tv=(TextView)findViewById(R.id.vt);
      c.start();
      c.setOnChronometerTickListener(new Chronometer.OnChronometerTickListener() {
         @Override
         public void onChronometerTick(Chronometer arg0) {
            tv.setText("Meaasge will be displayed after " + (duration - (i + 1)) + " seconds");
            i++;
            if (i >= duration)
            {
               Toast.makeText(getApplicationContext(),"Message"+(i/10),
Toast.LENGTH_LONG).show();
               duration=duration+10;
            }
         }
      });
   }
}
// activity_main.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"
   xmlns:tools="http://schemas.android.com/tools"
   android:layout_width="match_parent"
   android:layout_height="match_parent"
```

```
    tools:context=".MainActivity"
    android:background="#238059">

    <TextView
        android:textColor="#ffff"
        android:id="@+id/vt"
        android:layout_width="match_parent"
        android:layout_height="wrap_content"
        android:textSize="20sp"
        android:textAppearance="@android:style/TextAppearance.DeviceDefault.Medium" />

    <Chronometer
        android:textColor="#fff"
        android:textSize="20sp"
        android:id="@+id/mcc"
        android:layout_width="wrap_content"
        android:layout_height="wrap_content"
        android:layout_centerHorizontal="true"
        android:layout_centerVertical="true"
        android:format="Timer : %s"/>
</RelativeLayout>
```

OUTPUT:



Here we have selected the timer of 10 seconds so the toast will display for 10 seconds and the interval we use is 5 seconds..

LEARNING OUTCOME:

In this practical we learn how to display toast message in specific interval of time.

PRACTICAL 4

AIM:

Create a temperature converter Application. (Fahrenheit-Celsius)**.**

CODE:

```
// MainActivity.java

package com.example.dixit; //your package name
import android.os.Bundle;
import android.view.View;
import android.widget.EditText;
import android.widget.LinearLayout;
import android.widget.RadioButton;
import android.widget.TextView;
import android.app.Activity;
import android.graphics.Color;
public class MainActivity extends Activity {
   @Override
   protected void onCreate(Bundle savedInstanceState) {
      super.onCreate(savedInstanceState);
      setContentView(R.layout.activity_main);
   }
   public void add(View v)
   {
      LinearLayout ll=(LinearLayout)findViewById(R.id.ll);
      TextView result=(TextView)findViewById(R.id.result);
      EditText et1=(EditText)findViewById(R.id.editText1);

      //get value from edit text box and convert into double
      double a=Double.parseDouble(String.valueOf(et1.getText()));
      RadioButton cb=(RadioButton)findViewById(R.id.cb);
      RadioButton fb=(RadioButton)findViewById(R.id.fb);

      //check which radio button is checked
      if(cb.isChecked())
      {
         //change background colour
         ll.setBackgroundColor(Color.YELLOW);
         //display conversion
         result.setText(f2c(a)+" degree C");
         //cb.setChecked(false);
         fb.setChecked(true);
      }
      else if (fb.isChecked())
      {
         ll.setBackgroundColor(Color.CYAN);
         result.setText(c2f(a)+" degree F");
         //fb.setChecked(false);
```

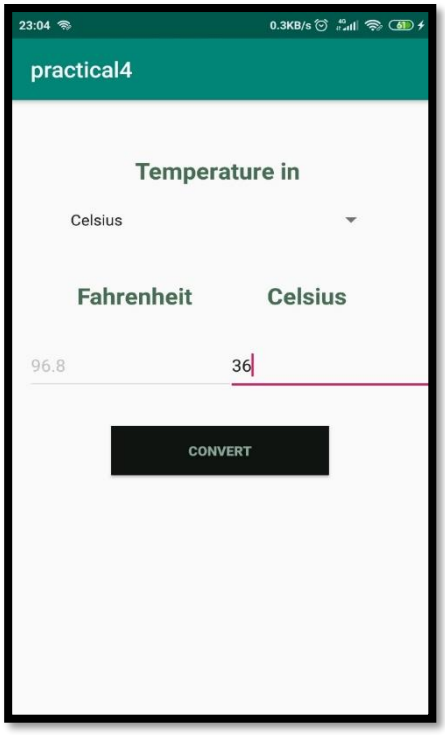
```
            cb.setChecked(true);
        }
    }
    //Celcius to Fahrenhiet method
    private double c2f(double c)
    {
        return (c*9)/5+32;
    }
    //Fahrenhiet to Celcius method
    private double f2c(double f)
    {
        return (f-32)*5/9;
    }
}
```

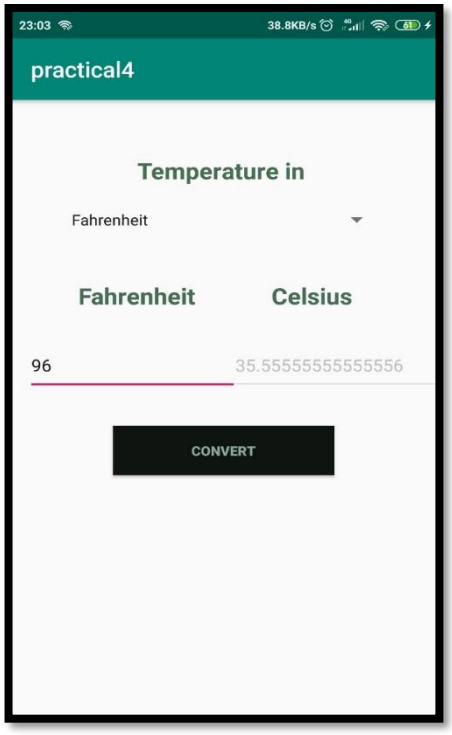
// activity_main.xml

```
<LinearLayout xmlns:android="http://schemas.android.com/apk/res/android"
    android:id="@+id/ll"
    android:layout_width="fill_parent"
    android:layout_height="fill_parent"
    android:orientation="vertical" >

    <EditText
        android:id="@+id/editText1"
        android:layout_width="match_parent"
        android:layout_height="wrap_content"
        android:inputType="numberDecimal" >
    </EditText>

    <TextView
        android:id="@+id/result"
        android:layout_width="wrap_content"
        android:layout_height="wrap_content"
        android:textSize="30sp" />

    <RadioGroup
        android:id="@+id/radioGroup1"
        android:layout_width="wrap_content"
        android:layout_height="wrap_content" >
        <RadioButton
            android:id="@+id/cb"
            android:layout_width="wrap_content"
            android:layout_height="wrap_content"
            android:checked="true"
            android:text="Celcius" />
        <RadioButton
            android:id="@+id/fb"
            android:layout_width="wrap_content"
            android:layout_height="wrap_content"
            android:text="Fahrenhiet" />
    </RadioGroup>
```

```
    <Button
        android:id="@+id/button1"
        android:layout_width="wrap_content"
        android:layout_height="wrap_content"
        android:onClick="add"
        android:text="Convert"
        android:textSize="30sp" />
</LinearLayout>
```

OUTPUT:





LEARNING OUTCOME:

We learn how to take temperature input from user and convert it into desired unit using button.We also learn how to take hint into Edit Text.

PRACTICAL 5

AIM:

Create a login application with following features:

1. Successful Login message in TextView with Green background if Username & password is correct

2. Failure message in TextView with Red background if Username or password is incorrect.

3. Disable Login Button after three wrong login attempts.

4. Close application if user selects Cancel Button.

CODE:

// MainActivity.java

```
package com.example.a17it043_wcmc_prac_5;
import androidx.appcompat.app.AppCompatActivity;

import android.graphics.Color;
import android.graphics.ColorFilter;
import android.os.Bundle;
import android.provider.CalendarContract;
import android.view.View;
import android.widget.Button;
import android.widget.EditText;
import android.widget.TextView;

public class MainActivity extends AppCompatActivity {

    EditText username,password;
    TextView message;
    Button cancel,login;
    String user,pass;
    int count = 1 ;

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

        username = findViewById(R.id.username);
        password = findViewById(R.id.password);
        cancel = findViewById(R.id.cancel);
        login = findViewById(R.id.login);
        message = findViewById(R.id.message);
```

```
        login.setOnClickListener(new View.OnClickListener() {
            @Override
            public void onClick(View v) {

                user = username.getText().toString();
                pass = password.getText().toString();

                if(user.equals("dixit") && pass.equals("dixit")){
                    message.setText(user+" Login Success Fully.");
                    message.setBackgroundColor(Color.parseColor("#006600"));
                }else{
                    message.setText("User Name or Password Incorrect."+count);
                    message.setBackgroundColor(Color.parseColor("#990000"));
                    count = count + 1;
                    if (count==4){
                        login.setEnabled(false);
                        login.setBackgroundColor(Color.BLACK);
                    }
                }
            }
        });

        cancel.setOnClickListener(new View.OnClickListener() {
            @Override
            public void onClick(View v) {
                System.exit(0);
            }
        });
    }
}
```

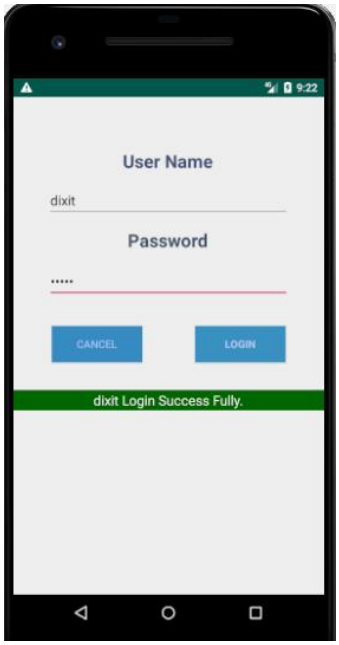
activity_main.xml

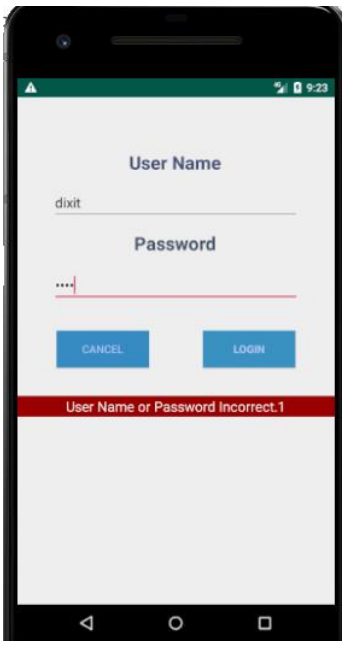
```
<?xml version="1.0" encoding="utf-8"?>
<androidx.constraintlayout.widget.ConstraintLayout
xmlns:android="http://schemas.android.com/apk/res/android"
    xmlns:app="http://schemas.android.com/apk/res-auto"
    xmlns:tools="http://schemas.android.com/tools"
    android:layout_width="match_parent"
    android:layout_height="match_parent"
    tools:context=".MainActivity">

    <TextView
        android:id="@+id/textView"
        android:layout_width="120dp"
        android:layout_height="40dp"
        android:gravity="center"
        android:text="User Name"
        android:textColor="#BF0F1D4E"
        android:textSize="24sp"
        android:textStyle="bold"
        app:layout_constraintBottom_toBottomOf="parent"
```

```
    app:layout_constraintEnd_toEndOf="parent"
    app:layout_constraintHorizontal_bias="0.498"
    app:layout_constraintStart_toStartOf="parent"
    app:layout_constraintTop_toTopOf="parent"
    app:layout_constraintVertical_bias="0.105" />

  <TextView
    android:id="@+id/textView2"
    android:layout_width="120dp"
    android:layout_height="40dp"
    android:gravity="center"
    android:text="Password"
    android:textColor="#C4132542"
    android:textSize="24sp"
    android:textStyle="bold"
    app:layout_constraintBottom_toBottomOf="parent"
    app:layout_constraintEnd_toEndOf="parent"
    app:layout_constraintHorizontal_bias="0.498"
    app:layout_constraintStart_toStartOf="parent"
    app:layout_constraintTop_toBottomOf="@+id/username"
    app:layout_constraintVertical_bias="0.022" />

  <EditText
    android:id="@+id/username"
    android:layout_width="320dp"
    android:layout_height="45dp"
    app:layout_constraintBottom_toBottomOf="parent"
    app:layout_constraintEnd_toEndOf="parent"
    app:layout_constraintHorizontal_bias="0.498"
    app:layout_constraintStart_toStartOf="parent"
    app:layout_constraintTop_toBottomOf="@+id/textView"
    app:layout_constraintVertical_bias="0.019" />

  <Button
    android:id="@+id/cancel"
    android:layout_width="120dp"
    android:layout_height="wrap_content"
    android:background="#C10477C0"
    android:text="@android:string/cancel"
    android:textColor="#AAC3F0"
    app:layout_constraintBottom_toBottomOf="parent"
    app:layout_constraintEnd_toEndOf="parent"
    app:layout_constraintHorizontal_bias="0.176"
    app:layout_constraintStart_toStartOf="parent"
    app:layout_constraintTop_toBottomOf="@+id/password"
    app:layout_constraintVertical_bias="0.105" />

  <Button
    android:id="@+id/login"
    android:layout_width="120dp"
    android:layout_height="wrap_content"
```

```
        android:background="#DA1F88C0"
        android:text="Login"
        android:textColor="#AAC3F0"
        android:textStyle="bold"
        app:layout_constraintBottom_toBottomOf="parent"
        app:layout_constraintEnd_toEndOf="parent"
        app:layout_constraintHorizontal_bias="0.827"
        app:layout_constraintStart_toStartOf="parent"
        app:layout_constraintTop_toBottomOf="@+id/password"
        app:layout_constraintVertical_bias="0.105" />

    <EditText
        android:id="@+id/password"
        android:layout_width="320dp"
        android:layout_height="45dp"
        android:layout_marginTop="12dp"
        android:ems="10"
        android:inputType="textPassword"
        app:layout_constraintBottom_toBottomOf="parent"
        app:layout_constraintEnd_toEndOf="parent"
        app:layout_constraintHorizontal_bias="0.505"
        app:layout_constraintStart_toStartOf="parent"
        app:layout_constraintTop_toBottomOf="@+id/textView2"
        app:layout_constraintVertical_bias="0.0" />

    <TextView
        android:id="@+id/message"
        android:layout_width="0dp"
        android:layout_height="27dp"
        android:gravity="center"
        android:textColor="#FAFCF7F7"
        android:textSize="18sp"
        app:layout_constraintBottom_toBottomOf="parent"
        app:layout_constraintEnd_toEndOf="parent"
        app:layout_constraintStart_toStartOf="parent"
        app:layout_constraintTop_toBottomOf="@+id/login"
        app:layout_constraintVertical_bias="0.13" />
</androidx.constraintlayout.widget.ConstraintLayout>
```

OUTPUT:





LEARNING OUTCOME:

In this Practical we learn how to create text view, button. We also learn how to disable button after some Login attempts.

PRACTICAL 6

AIM: Create an application which turns ON or OFF Torch/Flashlight of Camera.

CODE:

```
// MainActivity.java

package com.example.a17it043_wcmc_prac_6;
import androidx.annotation.RequiresApi;
import androidx.appcompat.app.AppCompatActivity;

import android.content.Context;
import android.hardware.camera2.CameraAccessException;
import android.hardware.camera2.CameraManager;
import android.os.Build;
import android.os.Bundle;
import android.view.View;
import android.widget.Button;
public class MainActivity extends AppCompatActivity {

   Button on,off;

   @RequiresApi(api = Build.VERSION_CODES.LOLLIPOP)
   @Override
   protected void onCreate(Bundle savedInstanceState) {
      super.onCreate( savedInstanceState );
      setContentView( R.layout.activity_main );

      on = findViewById(R.id.on);
      off = findViewById(R.id.off);

      final CameraManager camManager = (CameraManager)
getSystemService(Context.CAMERA_SERVICE);
      final String[] cameraId = {null};

      on.setOnClickListener(new View.OnClickListener() {
         @Override
         public void onClick(View v) {
            if (Build.VERSION.SDK_INT >= Build.VERSION_CODES.M) {
               try {
                  cameraId[0] = camManager.getCameraIdList()[0];
                  camManager.setTorchMode(cameraId[0], true);   //Turn ON
               } catch (CameraAccessException e) {
                  e.printStackTrace();
               }
            }
```

```
        }
    });

    off.setOnClickListener(new View.OnClickListener() {
        @RequiresApi(api = Build.VERSION_CODES.M)
        @Override
        public void onClick(View v) {
            try {
                camManager.setTorchMode(cameraId[0], false);
            } catch (CameraAccessException e) {
                e.printStackTrace();
            }
        }
    });
  }
}
```

// activity_main.xml

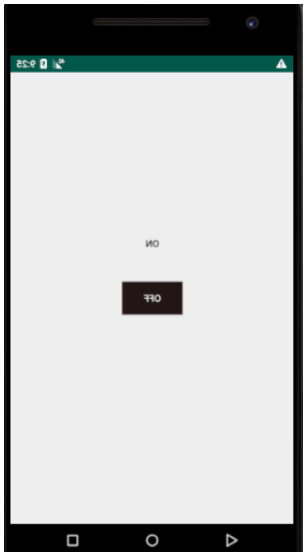
```
<?xml version="1.0" encoding="utf-8"?>
<androidx.constraintlayout.widget.ConstraintLayout
xmlns:android="http://schemas.android.com/apk/res/android"
   xmlns:app="http://schemas.android.com/apk/res-auto"
   xmlns:tools="http://schemas.android.com/tools"
   android:layout_width="match_parent"
   android:layout_height="match_parent"
   tools:context=".MainActivity">

   <Button
      android:id="@+id/on"
      android:layout_width="wrap_content"
      android:layout_height="wrap_content"
      android:background="#00C71E1E"
      android:text="ON"
      android:visibility="visible"
      app:layout_constraintBottom_toTopOf="@+id/off"
      app:layout_constraintEnd_toEndOf="parent"
      app:layout_constraintHorizontal_bias="0.501"
      app:layout_constraintStart_toStartOf="parent"
      app:layout_constraintTop_toTopOf="parent"
      app:layout_constraintVertical_bias="0.877" />

   <Button
      android:id="@+id/off"
      android:layout_width="wrap_content"
      android:layout_height="wrap_content"
      android:background="#F0180C0C"
      android:text="OFF"
      android:textColor="#F0FFFFFF"
      app:layout_constraintBottom_toBottomOf="parent"
      app:layout_constraintEnd_toEndOf="parent"
      app:layout_constraintStart_toStartOf="parent"
```

```
        app:layout_constraintTop_toTopOf="parent"
        tools:visibility="visible" />
</androidx.constraintlayout.widget.ConstraintLayout>
```

//amdroidManifest.xml

```
<?xml version="1.0" encoding="utf-8"?>
<manifest xmlns:android="http://schemas.android.com/apk/res/android"
    package="com.example.a17it043_wcmc_prac_6">

    <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/AppTheme">
        <activity
            android:name=".MainActivity"
            android:label="@string/app_name"
            android:theme="@style/AppTheme.NoActionBar">
            <intent-filter>
                <action android:name="android.intent.action.MAIN" />
                <category android:name="android.intent.category.LAUNCHER" />
            </intent-filter>
        </activity>
    </application>
</manifest>
```

OUTPUT:



LEARNING OUTCOME:

Working with Androidmanifest.xml file and giving permission.

PRACTICAL: 7

AIM:

Create an application that will change color of the screen, based on selected options from the menu.

CODE:

//MainActivity.java

```
package com.example.a17it043_wcmc_prac_7;

import androidx.appcompat.app.AppCompatActivity;

import android.content.Context;
import android.content.pm.PackageManager;
import android.graphics.Color;
import android.hardware.camera2.CameraAccessException;
import android.hardware.camera2.CameraManager;
import android.os.Bundle;
import android.view.View;
import android.widget.AdapterView;
import android.widget.ArrayAdapter;
import android.widget.LinearLayout;
import android.widget.Spinner;

import java.util.ArrayList;

public class MainActivity extends AppCompatActivity {
    Spinner s1;
    ArrayList<String> List = new ArrayList<String>();
    LinearLayout l1;
    @Override
    protected void onCreate(Bundle savedInstanceState) {
        super.onCreate(savedInstanceState);
        setContentView(R.layout.activity_main);
        List.add("Choose");
        List.add("Red");
        List.add("Green");
        List.add("Yellow");
        List.add("Blue");
        List.add("Black");
        l1=(LinearLayout)findViewById(R.id.ll);
        s1=(Spinner)findViewById(R.id.spinner1);
        ArrayAdapter<String> arrayAdapter = new ArrayAdapter<String>(MainActivity.this
                ,android.R.layout.simple_dropdown_item_1line,List);
        s1.setAdapter(arrayAdapter);
        s1.setOnItemSelectedListener(new AdapterView.OnItemSelectedListener(){
            public void onItemSelected(AdapterView<?> adapterView, View view, int i, long l) {
```

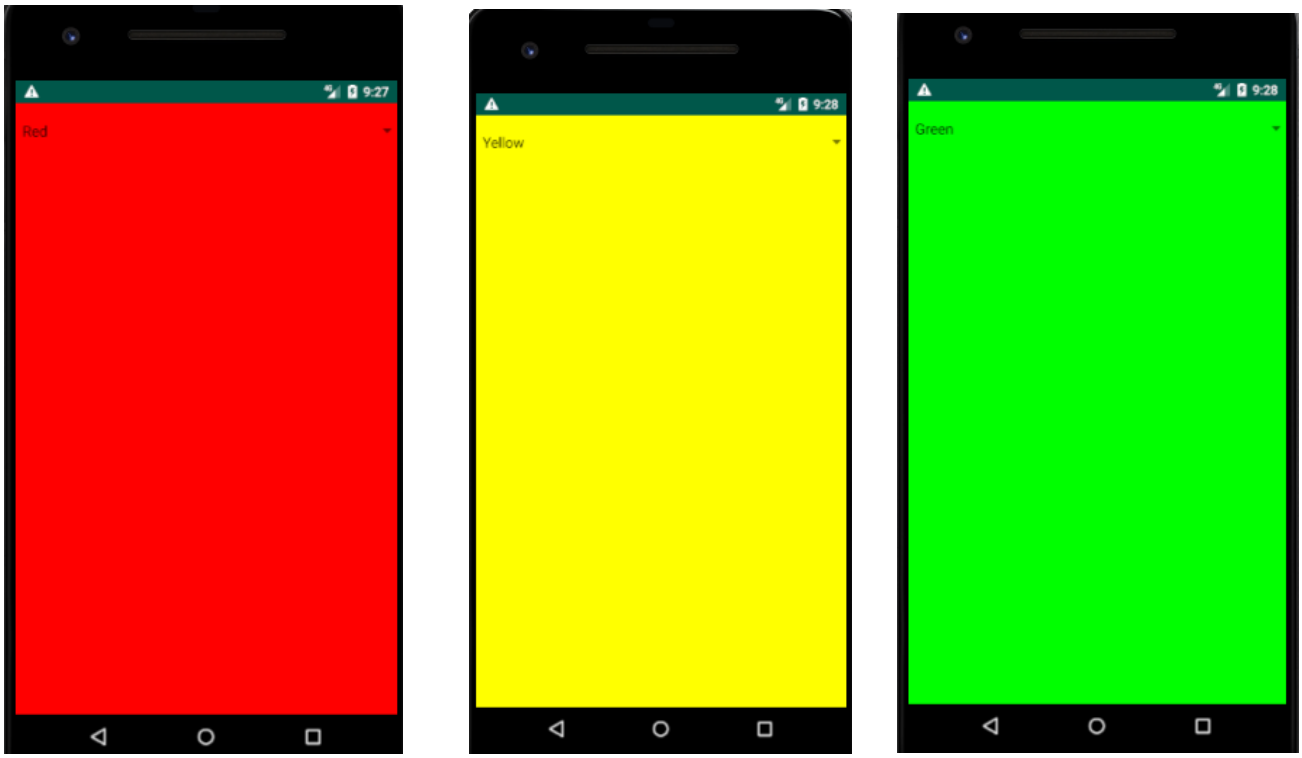
```
            String s = List.get(i);
            switch (s) {
               case "Choose": {
                  l1.setBackgroundColor(Color.WHITE);
                  break;
               }
               case "Red": {
                  l1.setBackgroundColor(Color.RED);
                  break;
               }
               case "Yellow": {
                  l1.setBackgroundColor(Color.YELLOW);
                  break;
               }
               case "Green": {
                  l1.setBackgroundColor(Color.GREEN);
                  break;
               }
               case "Blue": {
                  l1.setBackgroundColor(Color.BLUE);
                  break;
               }
               case "Black": {
                  l1.setBackgroundColor(Color.BLACK);
                  break;
               }
            }
         }

         @Override
         public void onNothingSelected(AdapterView<?> parent) {

         }
      });
   }
}
```

//activity_main.xml

```
<?xml version="1.0" encoding="utf-8"?>
<LinearLayout xmlns:android="http://schemas.android.com/apk/res/android"
   android:layout_width="fill_parent"
   android:layout_height="fill_parent"
   android:orientation="vertical"
   android:id="@+id/ll">

   <Spinner
      android:id="@+id/spinner1"
      android:layout_width="match_parent"
      android:layout_height="60dp" />
```

```
</LinearLayout>
```

OUTPUT:



PRACTICAL: 8

AIM:

Create an application with the help of fragment.

CODE:

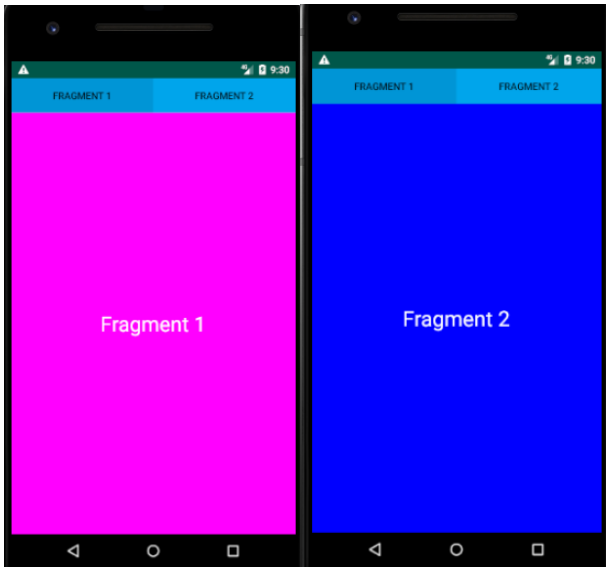
//MainActivity.java

```
package com.example.a17it043_wcmc_prac_8;

import androidx.appcompat.app.AppCompatActivity;
import androidx.fragment.app.Fragment;
import androidx.fragment.app.FragmentManager;
import androidx.fragment.app.FragmentTransaction;

import android.os.Bundle;
import android.view.View;

public class MainActivity extends AppCompatActivity {

    @Override
    protected void onCreate(Bundle savedInstanceState) {
        super.onCreate(savedInstanceState);
        setContentView(R.layout.activity_main);
    }
    public void changefragment(View view){
        Fragment fragment;

        if(view == findViewById(R.id.button1)){
            fragment = new Fragment1();
            FragmentManager fm=getSupportFragmentManager();
            FragmentTransaction ft = fm.beginTransaction();
            ft.replace(R.id.frag1, fragment);
            ft.commit();
        }
        if (view == findViewById(R.id.button2)){
            fragment = new Fragment2();
            FragmentManager fm=getSupportFragmentManager();
            FragmentTransaction ft = fm.beginTransaction();
            ft.replace(R.id.frag1, fragment);
            ft.commit();
        }   }
}
```

```
//Fragment1.java
package com.example.a17it043_wcmc_prac_8;
import android.os.Bundle;
import androidx.fragment.app.Fragment;
import android.view.LayoutInflater;
import android.view.View;
import android.view.ViewGroup;

public class Fragment1 extends Fragment {
   @Override
   public View onCreateView(LayoutInflater inflater, ViewGroup container,
                            Bundle savedInstanceState) {
      // Inflate the layout for this fragment
      return inflater.inflate(R.layout.fragment1, container, false);
   }
}
//Fragment2.java
package com.example.a17it043_wcmc_prac_8;
import android.os.Bundle;
import androidx.fragment.app.Fragment;
import android.view.LayoutInflater;
import android.view.View;
import android.view.ViewGroup;

public class Fragment2 extends Fragment {
   @Override
   public View onCreateView(LayoutInflater inflater, ViewGroup container,
                            Bundle savedInstanceState) {
      // Inflate the layout for this fragment
      return inflater.inflate(R.layout.fragment2, container, false);
   }
}
//activity_main.xml
<?xml version="1.0" encoding="utf-8"?>
<LinearLayout xmlns:android="http://schemas.android.com/apk/res/android"
   xmlns:app="http://schemas.android.com/apk/res-auto"
   xmlns:tools="http://schemas.android.com/tools"
   android:layout_width="match_parent"
   android:layout_height="match_parent"
   tools:context=".MainActivity"
   android:orientation="vertical">

   <LinearLayout
      android:weightSum="2"
```

```
        android:layout_width="match_parent"
        android:layout_height="wrap_content"
        >
        <Button
            android:id="@+id/button1"
            android:layout_width="0dp"
            android:layout_height="50dp"
            android:layout_weight="1"
            android:background="#0295D6"
            android:onClick="changefragment"
            android:text="Fragment 1" />
        <Button
            android:id="@+id/button2"
            android:layout_width="0dp"
            android:layout_height="50dp"
            android:layout_weight="1"
            android:background="#0DA5EB"
            android:onClick="changefragment"
            android:text="Fragment 2" />
    </LinearLayout>
    <FrameLayout
        android:id="@+id/frag1"
        android:layout_width="match_parent"
        android:layout_height="match_parent">
    </FrameLayout>
</LinearLayout>
```

OUTPUT:



PRACTICAL: 9

AIM:

Create an application with the help of web view.

CODE:

//MainActivity.java

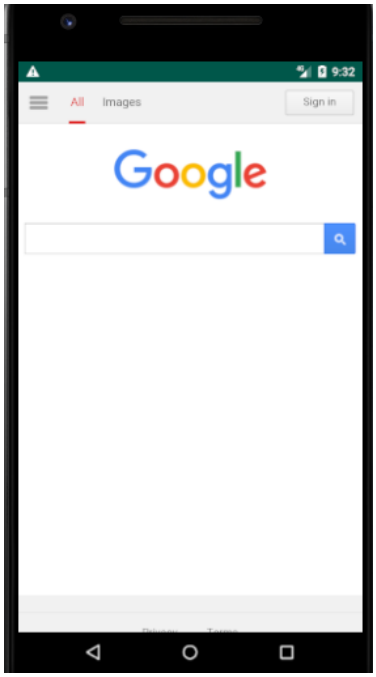
```
package com.example.a17it043_wcmc_prac_9;

import android.os.Bundle;

import com.google.android.material.floatingactionbutton.FloatingActionButton;
import com.google.android.material.snackbar.Snackbar;

import androidx.appcompat.app.AppCompatActivity;
import androidx.appcompat.widget.Toolbar;

import android.view.View;
import android.view.Menu;
import android.view.MenuItem;
import android.webkit.WebView;
import android.webkit.WebViewClient;

public class MainActivity extends AppCompatActivity {

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

      webView=findViewById(R.id.webview);
      webView.setWebViewClient(new WebViewClient());
      webView.loadUrl("http://www.google.com");
   }

   @Override
   public void onBackPressed() {
      if(webView.canGoBack()){
         webView.goBack();
      }else {
         super.onBackPressed();
      }
   }
}
```

//activity_main.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"
```

```
    xmlns:tools="http://schemas.android.com/tools"
    android:layout_width="match_parent"
    android:layout_height="match_parent"
    tools:context=".MainActivity">

  <WebView
      android:id="@+id/webview"
      android:layout_width="match_parent"
      android:layout_height="match_parent"/>


</RelativeLayout>
```

OUTPUT:



LEARNING OUTCOME:

In this practical we learnt How to use Web view in Application to load any webpage.We also learn some methods like loadurl which is used to load webpage.

PRACTICAL: 10

AIM:

Create an application with the help of database.

CODE:

//MainActivity.java

```
package com.example.a17it043_wcmc_prac_10;

import android.os.Bundle;

import com.google.android.material.floatingactionbutton.FloatingActionButton;
import com.google.android.material.snackbar.Snackbar;
import com.google.firebase.database.DataSnapshot;
import com.google.firebase.database.DatabaseError;
import com.google.firebase.database.DatabaseReference;
import com.google.firebase.database.FirebaseDatabase;
import com.google.firebase.database.ValueEventListener;

import androidx.appcompat.app.AppCompatActivity;
import androidx.appcompat.widget.Toolbar;

import android.util.Log;
import android.view.View;
import android.view.Menu;
import android.view.MenuItem;
import android.widget.EditText;
import android.widget.TextView;
import android.widget.Toast;

public class MainActivity extends AppCompatActivity {

    private EditText email;
    private EditText phone;
    private TextView settext;
    private  EditText takeemail2;
    FirebaseDatabase database = FirebaseDatabase.getInstance();

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

    public void submit(View view) {
        email = findViewById(R.id.editText);
        phone = findViewById(R.id.editText3);
        DatabaseReference myRef =
database.getReference("Details").child(email.getText().toString());
```

```
        myRef.setValue(phone.getText().toString());
    }

    public void showdetails(View view){

        settext= findViewById(R.id.textView3);
        takeemail2=findViewById(R.id.editText4);

        String abc=takeemail2.getText().toString();

        DatabaseReference myRef1 = database.getReference("Details").child(abc);

        myRef1.addValueEventListener(new ValueEventListener() {
            @Override
            public void onDataChange(DataSnapshot dataSnapshot) {

                String value = dataSnapshot.getValue(String.class);
                settext.setText(value);
            }

            @Override
            public void onCancelled(DatabaseError error) {
                Log.w("ERROR", "Failed to read value.", error.toException());
            }
        });
    }

    @Override
    public boolean onCreateOptionsMenu(Menu menu) {
        // Inflate the menu; this adds items to the action bar if it is present.
        getMenuInflater().inflate(R.menu.menu_main, menu);
        return true;
    }
}
```

//AndroidManifest.xml

```
<?xml version="1.0" encoding="utf-8"?>
<manifest xmlns:android="http://schemas.android.com/apk/res/android"
    package="com.example.a17it043_wcmc_prac_10">

    <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/AppTheme">
        <activity
```

```
        android:name=".MainActivity"
        android:label="@string/app_name"
        android:theme="@style/AppTheme.NoActionBar">
        <intent-filter>
          <action android:name="android.intent.action.MAIN" />

          <category android:name="android.intent.category.LAUNCHER" />
        </intent-filter>
      </activity>
   </application>
</manifest>
```

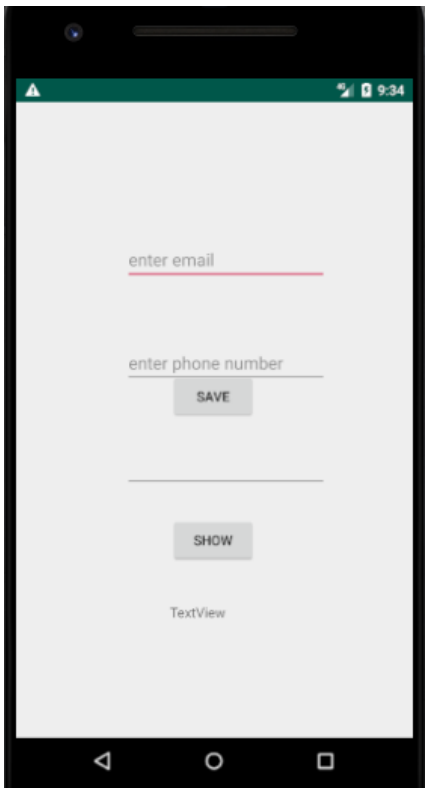
//activity_main.xml

```
<?xml version="1.0" encoding="utf-8"?>
<androidx.constraintlayout.widget.ConstraintLayout
xmlns:android="http://schemas.android.com/apk/res/android"
   xmlns:app="http://schemas.android.com/apk/res-auto"
   xmlns:tools="http://schemas.android.com/tools"
   android:layout_width="match_parent"
   android:layout_height="match_parent"
   tools:context=".MainActivity">


   <EditText
      android:id="@+id/editText"
      android:layout_width="wrap_content"
      android:layout_height="wrap_content"
      android:layout_alignParentStart="true"
      android:layout_alignParentLeft="true"
      android:layout_alignParentTop="true"
      android:layout_alignParentEnd="true"
      android:layout_alignParentRight="true"
      android:layout_alignParentBottom="true"
      android:ems="10"
      android:hint="enter email"
      android:inputType="textPersonName"
      app:layout_constraintBottom_toBottomOf="parent"
      app:layout_constraintEnd_toEndOf="parent"
      app:layout_constraintHorizontal_bias="0.563"
      app:layout_constraintStart_toStartOf="parent"
      app:layout_constraintTop_toTopOf="parent"
      app:layout_constraintVertical_bias="0.23" />

   <EditText
      android:id="@+id/editText3"
      android:layout_width="wrap_content"
      android:layout_height="wrap_content"
      android:layout_alignParentStart="true"
      android:layout_alignParentLeft="true"
```

```
    android:layout_alignParentTop="true"
    android:layout_alignParentEnd="true"
    android:layout_alignParentRight="true"
    android:layout_alignParentBottom="true"
    android:layout_marginTop="248dp"
    android:ems="10"
    android:hint="enter phone number"
    android:inputType="phone"
    app:layout_constraintEnd_toEndOf="parent"
    app:layout_constraintHorizontal_bias="0.563"
    app:layout_constraintStart_toStartOf="parent"
    app:layout_constraintTop_toTopOf="parent" />

<Button
    android:id="@+id/button"
    android:layout_width="wrap_content"
    android:layout_height="wrap_content"
    android:layout_alignParentStart="true"
    android:layout_alignParentLeft="true"
    android:layout_alignParentTop="true"
    android:layout_alignParentEnd="true"
    android:layout_alignParentRight="true"
    android:layout_alignParentBottom="true"
    android:onClick="submit"
    android:text="Save"
    app:layout_constraintBottom_toBottomOf="parent"
    app:layout_constraintEnd_toEndOf="parent"
    app:layout_constraintHorizontal_bias="0.498"
    app:layout_constraintStart_toStartOf="parent"
    app:layout_constraintTop_toTopOf="parent"
    app:layout_constraintVertical_bias="0.46" />

<TextView
    android:id="@+id/textView3"
    android:layout_width="143dp"
    android:layout_height="50dp"
    android:text="TextView"
    android:hint="enter email"
    app:layout_constraintBottom_toBottomOf="parent"
    app:layout_constraintEnd_toEndOf="parent"
    app:layout_constraintHorizontal_bias="0.597"
    app:layout_constraintStart_toStartOf="parent"
    app:layout_constraintTop_toTopOf="parent"
    app:layout_constraintVertical_bias="0.852" />

<EditText
    android:id="@+id/editText4"
    android:layout_width="wrap_content"
    android:layout_height="wrap_content"
    android:ems="10"
    android:inputType="textEmailAddress"
```

```
        app:layout_constraintBottom_toBottomOf="parent"
        app:layout_constraintEnd_toEndOf="parent"
        app:layout_constraintHorizontal_bias="0.563"
        app:layout_constraintStart_toStartOf="parent"
        app:layout_constraintTop_toTopOf="parent"
        app:layout_constraintVertical_bias="0.58" />

    <Button
        android:id="@+id/button2"
        android:layout_width="wrap_content"
        android:layout_height="wrap_content"
        android:text="Show"
        app:layout_constraintBottom_toBottomOf="parent"
        app:layout_constraintEnd_toEndOf="parent"
        app:layout_constraintHorizontal_bias="0.498"
        app:layout_constraintStart_toStartOf="parent"
        app:layout_constraintTop_toTopOf="parent"
        app:layout_constraintVertical_bias="0.704"
        android:onClick="showdetails"/>

</androidx.constraintlayout.widget.ConstraintLayout>
```

OUTPUT:



LEARNING OUTCOME:

We learnt that how to use database with android where we used sqlite which stores data in text file in the device of the data. We learnt how to create and open a database and also how to create a table. We learnt how to fire sql queries and also use the cursor to get if any data is selected or not. We also used raw query function as execsql cannot be used to run select queries. So we leant how to insert, delete and view from a database in android.

PRACTICAL: 11

AIM: Creating an application that provides Single Sign-on (SSO) with Chrome Custom Tabs via the AppAuth library, and optionally push managed configuration to provide a user login hint.

Source Code:

Java File/s:

MainActivity.java

```
import androidx.appcompat.app.AppCompatActivity;


import android.os.Bundle;
import android.content.Intent;
import android.util.Log;
import android.view.View;
import android.widget.Toast;
import com.google.android.gms.auth.api.signin.GoogleSignIn;
import com.google.android.gms.auth.api.signin.GoogleSignInAccount; import com.google.android.gms.auth.api.signin.GoogleSignInClient; import com.google.android.gms.auth.api.signin.GoogleSignInOptions; import com.google.android.gms.common.SignInButton;
import com.google.android.gms.common.api.ApiException;
import com.google.android.gms.tasks.Task;


public class MainActivity extends AppCompatActivity {


int RC_SIGN_IN = 0; SignInButton signInButton; GoogleSignInClient mGoogleSignInClient;


@Override
protected void onCreate(Bundle savedInstanceState) { super.onCreate(savedInstanceState); setContentView(R.layout.activity_main);
signInButton = findViewById(R.id.sign_in_button); GoogleSignInOptions gso = new GoogleSignInOptions.Builder(GoogleSignInOptions.DEFAULT_SIGN_IN)
.requestEmail()
.build();


mGoogleSignInClient = GoogleSignIn.getClient(this, gso);


signInButton.setOnClickListener(new View.OnClickListener() {
@Override
public void onClick(View view) {
signIn();
```

```
}
});
}
private void signIn() {
Intent signInIntent = mGoogleSignInClient.getSignInIntent();
startActivityForResult(signInIntent, RC_SIGN_IN);
}


@Override
public void onActivityResult(int requestCode, int resultCode, Intent data) {
super.onActivityResult(requestCode, resultCode, data);


if (requestCode == RC_SIGN_IN) {
Task<GoogleSignInAccount> task = GoogleSignIn.getSignedInAccountFromIntent(data);
handleSignInResult(task);
}
}


private void handleSignInResult(Task<GoogleSignInAccount> completedTask) {
try {
GoogleSignInAccount account = completedTask.getResult(ApiException.class);
startActivity(new Intent(MainActivity.this, Main2Activity.class));
} catch (ApiException e) {
Log.w("Google Sign In Error", "signInResult:failed code=" + e.getStatusCode());
Toast.makeText(MainActivity.this, "Failed  ", Toast.LENGTH_LONG).show();
}
}


@Override
protected void onStart() {
GoogleSignInAccount account = GoogleSignIn.getLastSignedInAccount(this);
if(account != null) {
startActivity(new Intent(MainActivity.this, Main2Activity.class));
}
super.onStart();
}
}
```

Main2Activity

```
package com.example.a17it091_wcmc_pr11;
import androidx.appcompat.app.AppCompatActivity;
import android.os.Bundle;
import android.content.Intent;

import android.net.Uri;
import androidx.annotation.NonNull;
```

```
import android.view.View; import android.widget.Button; import android.widget.ImageView; import android.widget.TextView; import android.widget.Toast;
import com.google.android.gms.auth.api.signin.GoogleSignIn;
import com.google.android.gms.auth.api.signin.GoogleSignInAccount; import com.google.android.gms.auth.api.signin.GoogleSignInClient; import com.google.android.gms.auth.api.signin.GoogleSignInOptions; import com.google.android.gms.tasks.OnCompleteListener;
import com.google.android.gms.tasks.Task;


import java.net.URI;


public class Main2Activity extends AppCompatActivity{ GoogleSignInClient mGoogleSignInClient;
Button sign_out; TextView nameTV; TextView emailTV; ImageView photoIV;


@Override
protected void onCreate(Bundle savedInstanceState) { super.onCreate(savedInstanceState);
setContentView(R.layout.activity_main2);
sign_out = findViewById(R.id.log_out); nameTV = findViewById(R.id.name); emailTV = findViewById(R.id.email); photoIV = findViewById(R.id.photo); GoogleSignInOptions gso = new
GoogleSignInOptions.Builder(GoogleSignInOptions.DEFAULT_SIGN_IN)
.requestEmail()
.build();
mGoogleSignInClient = GoogleSignIn.getClient(this, gso);
GoogleSignInAccount acct = GoogleSignIn.getLastSignedInAccount(Main2Activity.this);
if (acct != null) {
String personName = acct.getDisplayName();

String personGivenName = acct.getGivenName(); String personFamilyName = acct.getFamilyName();
String personEmail = acct.getEmail();
String personId = acct.getId();
Uri personPhoto = acct.getPhotoUrl(); nameTV.setText("Name: "+personName);
emailTV.setText("Email: "+personEmail);
}


sign_out.setOnClickListener(new View.OnClickListener() {
@Override
public void onClick(View view) {
signOut();
}
});
}


private void signOut() {
mGoogleSignInClient.signOut()
```

```
.addOnCompleteListener(this, new OnCompleteListener<Void>() {
@Override
public void onComplete(@NonNull Task<Void> task) {
Toast.makeText(Main2Activity.this,"Successfully signed
out",Toast.LENGTH_SHORT).show();
startActivity(new Intent(Main2Activity.this, MainActivity.class));
finish();
}
});
}
}
```

Layout File/s:
activity_main.xml

```
activity_main2.xml
activity_main.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"
xmlns:tools="http://schemas.android.com/tools"
android:layout_width="match_parent"
android:layout_height="match_parent"
tools:context=".MainActivity"
android:background="@color/colorPrimary">
<com.google.android.gms.common.SignInButton
android:id="@+id/sign_in_button"
android:layout_width="wrap_content"
android:layout_height="wrap_content"
android:layout_centerHorizontal="true"
android:layout_centerVertical="true"/>
</RelativeLayout>
activity_main2.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"
xmlns:tools="http://schemas.android.com/tools"
android:layout_width="match_parent"
android:layout_height="match_parent"
tools:context=".Main2Activity">
<LinearLayout
android:layout_width="wrap_content"
android:layout_height="wrap_content"
android:orientation="vertical"
android:layout_centerHorizontal="true"
android:layout_centerVertical="true">
<ImageView

android:layout_width="80dp"
android:layout_height="80dp"
android:background="@drawable/ic_person"
android:layout_gravity="center"
```

```
android:id="@+id/photo"/>
<TextView
android:layout_width="wrap_content"
android:layout_height="wrap_content"
android:id="@+id/name"
android:text="Name: NAME HERE"
android:textSize="18sp"
android:textColor="@color/colorPrimary"
android:layout_gravity="center"/>
<TextView
android:layout_width="wrap_content"
android:layout_height="wrap_content"
android:id="@+id/email"
android:text="Email: EMAIL HERE"
android:textSize="18sp"
android:textColor="@color/colorPrimary"
android:layout_gravity="center"/>
</LinearLayout>
<Button
android:layout_width="wrap_content"
android:layout_height="wrap_content"
android:id="@+id/log_out"
android:text="Sign out"
android:layout_centerHorizontal="true"
android:layout_alignParentBottom="true"
android:layout_marginBottom="20dp"
android:background="@color/colorPrimary"
android:textColor="#fff"/>
</RelativeLayout>
```

Output:

PRACTICAL:12

AIM:Create an application to handle support voice interaction.

Source Code:

Program: activity_main.xml

```
<?xml version="1.0" encoding="utf-8"?>
<android.support.constraint.ConstraintLayout
xmlns:android="http://schemas.android.com/apk/res/android"
   xmlns:app="http://schemas.android.com/apk/res-auto"
xmlns:tools="http://schemas.android.com/tools"
android:layout_width="match_parent"
android:layout_height="match_parent"
tools:context="com.example.prac12.MainActivity">

<TextView
      android:id="@+id/textView"
android:layout_width="wrap_content"
android:layout_height="wrap_content"
android:layout_marginTop="168dp"
      android:text="Wait till Question PopUP!!"
android:textSize="24sp"
app:layout_constraintHorizontal_bias="0.501"
app:layout_constraintLeft_toLeftOf="parent"
app:layout_constraintRight_toRightOf="parent"
app:layout_constraintTop_toTopOf="parent" />
<TextView
      android:id="@+id/textView1"
android:layout_width="wrap_content"
android:layout_height="wrap_content"
android:layout_marginBottom="8dp"
android:layout_marginEnd="8dp"
android:layout_marginStart="8dp"
android:layout_marginTop="8dp"
      android:text="Speak your answer"
android:textSize="24sp"
app:layout_constraintBottom_toBottomOf="parent"
app:layout_constraintEnd_toEndOf="parent"
app:layout_constraintHorizontal_bias="0.501"
app:layout_constraintStart_toStartOf="parent"
app:layout_constraintTop_toBottomOf="@+id/textView"
app:layout_constraintVertical_bias="0.171" />
</android.support.constraint.ConstraintLayout>
```

Program: MainActivity.java

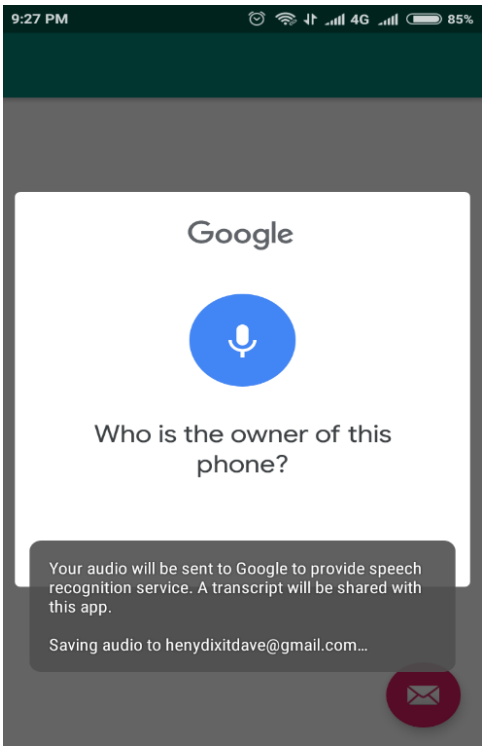
```
package com.example.prac12;

import android.content.Intent;

import android.speech.RecognizerIntent;
```

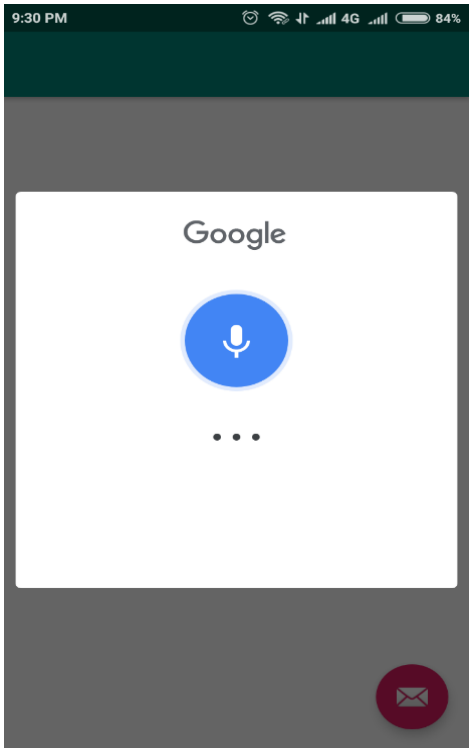
```
import android.speech.tts.TextToSpeech;
import android.support.v7.app.AppCompatActivity;
import android.os.Bundle;
import android.widget.TextView;
import java.util.List;
import java.util.Locale;


public class MainActivity extends AppCompatActivity {


   private TextToSpeech t1;
   private final int REQUEST_SPEECH_RECOGNIZER = 3000;
   private TextView question, answer;
   private final String mQuestion = "Who is the owner of this phone?";
   private String mAnswer = "";
   @Override
   protected void onCreate(Bundle savedInstanceState) {
super.onCreate(savedInstanceState);
      setContentView(R.layout.activity_main);
      question = (TextView) findViewById(R.id.textView);
      answer = (TextView) findViewById(R.id.textView1);
      t1=new TextToSpeech(getApplicationContext(), new TextToSpeech.OnInitListener() {
         @Override
         public void onInit(int status) {
if(status != TextToSpeech.ERROR) {
               t1.setLanguage(Locale.UK);
            }
         }
      });
startSpeechRecognizer();
   }
```

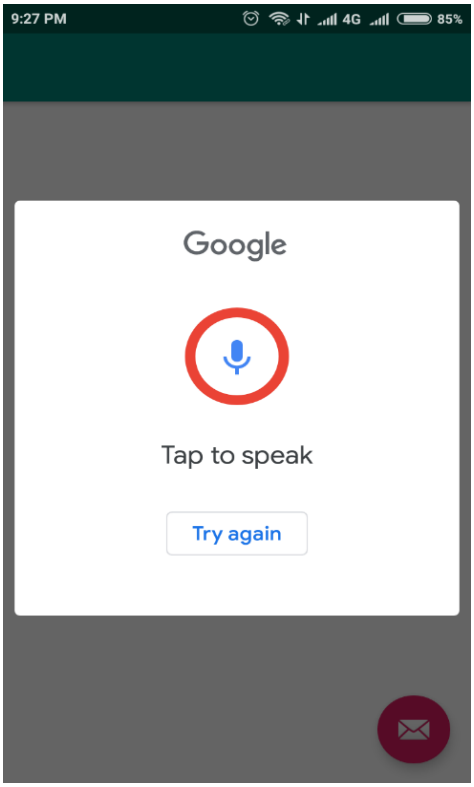
```
   private void startSpeechRecognizer() {
      Intent intent = new Intent
            (RecognizerIntent.ACTION_RECOGNIZE_SPEECH);
intent.putExtra(RecognizerIntent.EXTRA_LANGUAGE_MODEL,
            RecognizerIntent.LANGUAGE_MODEL_FREE_FORM);
intent.putExtra(RecognizerIntent.EXTRA_PROMPT, mQuestion);
startActivityForResult(intent, REQUEST_SPEECH_RECOGNIZER);
   }
   @Override
   protected void onActivityResult(int requestCode, int resultCode,
                           Intent data) {
super.onActivityResult(requestCode, resultCode, data);

      if (requestCode == REQUEST_SPEECH_RECOGNIZER) {
         if (resultCode == RESULT_OK) {
            List<String> results = data.getStringArrayListExtra
                  (RecognizerIntent.EXTRA_RESULTS);
            mAnswer = results.get(0);
question.setText(mQuestion);
answer.setText(mAnswer);
            if (mAnswer.toUpperCase().indexOf("SMIT") > -1) {
               t1.speak("Great You are correct", TextToSpeech.QUEUE_FLUSH, null, "adfvsfgbrsgh");
            }
            else {
               t1.speak("Wrong answer submit this phone to my owner Smit", TextToSpeech.QUEUE_FLUSH, null,
"adfvsfgbrsgh");
            }
         }
      }
   }
   @Override
```

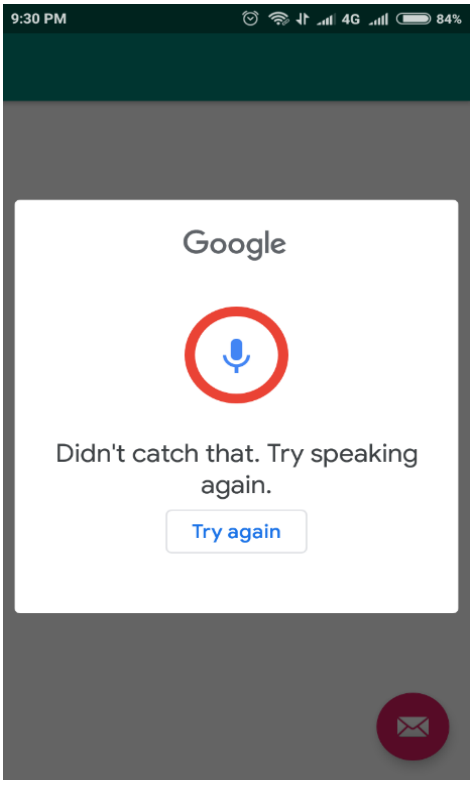
```
   public void onPause(){
if(t1 !=null){
          t1.stop();
          t1.shutdown();
      }
super.onPause();
   }
}
```

Output:




9:30 PM
84%
Google


9:27 PM
85%
Google
Tap to speak
Try again


9:30 PM
84%
Google
Didn't catch that. Try speaking again.
Try again

PRACTICAL:13

AIM: Create an application to play video using the YouTube API in PIP mode.

Source Code:

Program: activity_main.xml

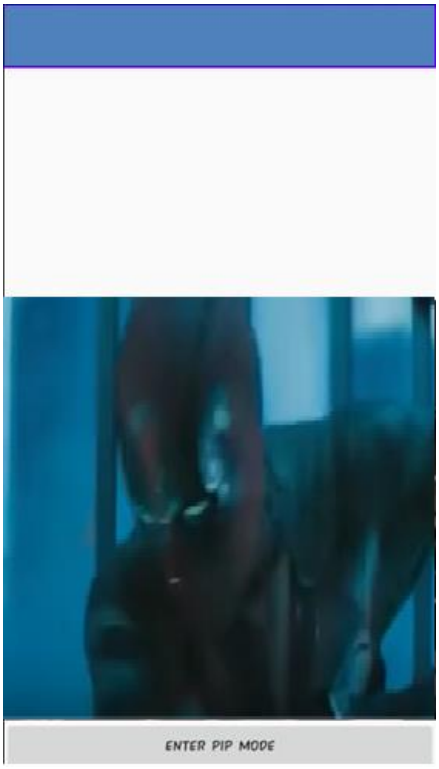
```
<?xml version="1.0" encoding="utf-8"?>
<RelativeLayout
   xmlns:android="http://schemas.android.com/apk/res/android"
   xmlns:app="http://schemas.android.com/apk/res-auto"
   xmlns:tools="http://schemas.android.com/tools"
   android:layout_width="match_parent"
   android:layout_height="match_parent"
   tools:context=".MainActivity">
<VideoView
      android:layout_width="match_parent"
      android:layout_height="match_parent"
      android:id="@+id/video"
      android:layout_above="@id/pipbtn"/>
<Button
      android:layout_width="match_parent"
      android:layout_height="wrap_content"
      android:text="Enter PIP mode"
      android:layout_alignParentBottom="true"
      android:id="@+id/pipbtn"/>
</RelativeLayout>
```

Program: MainActivity.java

```
package com.example.practical13;

import androidx.appcompat.app.AppCompatActivity;

import android.app.ActionBar;
import android.app.Notification;
import android.app.PictureInPictureParams;
import android.drm.DrmStore;
import android.graphics.Point;
import android.net.Uri;
import android.os.Bundle;
import android.util.Rational;
import android.view.Display;
import android.view.View;
import android.widget.Button;
import android.widget.MediaController;
```

```
import android.widget.VideoView;

public class MainActivity extends AppCompatActivity {

   Button pipbtn;
   String path = "/storage/DCIM/Camera/movie.mp4";
   ActionBar actionBar;
   VideoView video;

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

      video = (VideoView)findViewById(R.id.video);
      actionBar = getActionBar();
      MediaController mediaController= new MediaController(this);
      mediaController.setAnchorView(video);
      video.setMediaController(mediaController);
      video.setVideoURI(Uri.parse(path));
      video.requestFocus();
      video.start();

      pipbtn = (Button)findViewById(R.id.pipbtn);
      pipbtn.setOnClickListener(new View.OnClickListener() {
         @Override
               public void onClick(View view) {
            Display display = getWindowManager().getDefaultDisplay();
            Point point = new Point();
            display.getSize(point);
            int width = point.x;
            int height = point.y;
            Rational ratio = new Rational(width,height);
            PictureInPictureParams.Builder pip_builder = new PictureInPictureParams.Builder();
            pip_builder.setAspectRatio(ratio).build();
            pipbtn.setVisibility(View.INVISIBLE);
            enterPictureInPictureMode(pip_builder.build());

         }
      });
}
}
```

Output:


ENTER PIP MODE


10:26 PM
All
Communication
Entertainment
Instagram
WhatsApp
File Mana..
CHARUSAT
Gallery
LinkedIn
Settings
redBus
Maps
JioTV
ADM
ALTBalaji
Amazon Ki..
Amazon M..
Amazon S..
AMOLED..
AnimeX W..
AnyBoo..
BitTorrent
Blue VPN
Boom
Calendar
Camera
CamScann..
Cent Mobil..
CHARUSAT

PRACTICAL: 14

AIM: Create an application that uses the end-to-end process of training a machine learning model that can recognize handwritten digit images with TensorFlow and deploy it to an Android app.

Source Code:

Layout File/s:
activity_main.xml

```
<?xml version="1.0" encoding="utf-8"?>
<androidx.constraintlayout.widget.ConstraintLayout
    xmlns:android="http://schemas.android.com/apk/res/android"
    xmlns:app="http://schemas.android.com/apk/res-auto"
    xmlns:tools="http://schemas.android.com/tools"
    android:layout_width="match_parent"
    android:layout_height="match_parent"
    tools:context=".MainActivity">

  <com.divyanshu.draw.widget.DrawView
      android:id="@+id/draw_view"
      android:layout_width="match_parent"
      android:layout_height="0dp"
      app:layout_constraintDimensionRatio="1:1"
      app:layout_constraintTop_toTopOf="parent"/>

  <TextView
      android:id="@+id/predicted_text"
      android:textStyle="bold"
      android:layout_width="wrap_content"
      android:layout_height="wrap_content"
      android:text="@string/prediction_text_placeholder"
      android:textSize="20sp"
      app:layout_constraintBottom_toTopOf="@id/clear_button"
      app:layout_constraintLeft_toLeftOf="parent"
      app:layout_constraintRight_toRightOf="parent"
      app:layout_constraintTop_toBottomOf="@id/draw_view"/>

  <Button
      android:id="@+id/clear_button"
      android:layout_width="wrap_content"
      android:layout_height="wrap_content"
      android:text="@string/clear_button_text"
      app:layout_constraintBottom_toBottomOf="parent"
      app:layout_constraintLeft_toLeftOf="parent"
      app:layout_constraintRight_toRightOf="parent"/>

</androidx.constraintlayout.widget.ConstraintLayout>
```

File/s:
MainActivity.kt

```
package org.tensorflow.lite.codelabs.digitclassifier

import android.annotation.SuppressLint
import android.graphics.Color
import android.os.Bundle
```

```
import android.util.Log
import android.view.MotionEvent
import android.widget.Button
import android.widget.TextView
import androidx.appcompat.app.AppCompatActivity
import com.divyanshu.draw.widget.DrawView

class MainActivity : AppCompatActivity() {

  private var drawView: DrawView? = null
  private var clearButton: Button? = null
  private var predictedTextView: TextView? = null
  private var digitClassifier = DigitClassifier(this)

  @SuppressLint("ClickableViewAccessibility")
  override fun onCreate(savedInstanceState: Bundle?) {
    super.onCreate(savedInstanceState)
    setContentView(R.layout.activity_main)

    // Setup view instances.
    drawView = findViewById(R.id.draw_view)
    drawView?.setStrokeWidth(70.0f)
    drawView?.setColor(Color.WHITE)
    drawView?.setBackgroundColor(Color.BLACK)
    clearButton = findViewById(R.id.clear_button)
    predictedTextView = findViewById(R.id.predicted_text)

    // Setup clear drawing button.
    clearButton?.setOnClickListener {
      drawView?.clearCanvas()
      predictedTextView?.text = getString(R.string.prediction_text_placeholder)
    }

    // Setup classification trigger so that it classify after every stroke drew.
    drawView?.setOnTouchListener { _, event ->
      // As we have interrupted DrawView's touch event,
      // we first need to pass touch events through to the instance for the drawing to show
up.
      drawView?.onTouchEvent(event)

      // Then if user finished a touch event, run classification
      if (event.action == MotionEvent.ACTION_UP) {
        classifyDrawing()
      }

      true
    }

    // Setup digit classifier.
    digitClassifier
      .initialize()
      .addOnFailureListener { e -> Log.e(TAG, "Error to setting up digit classifier.", e) }
  }

  override fun onDestroy() {
    // Sync DigitClassifier instance lifecycle with MainActivity lifecycle,
    // and free up resources (e.g. TF Lite instance) once the activity is destroyed.
    digitClassifier.close()
    super.onDestroy()
  }

  private fun classifyDrawing() {
    val bitmap = drawView?.getBitmap()

    if ((bitmap != null) && (digitClassifier.isInitialized)) {
      digitClassifier
        .classifyAsync(bitmap)
        .addOnSuccessListener { resultText -> predictedTextView?.text = resultText }
        .addOnFailureListener { e ->
          predictedTextView?.text = getString(
```

```
            R.string.classification_error_message,
            e.localizedMessage
          )
          Log.e(TAG, "Error classifying drawing.", e)
        }
    }
  }

  companion object {
    private const val TAG = "MainActivity"
  }
}
```

Digitclassifier.kt

```
package org.tensorflow.lite.codelabs.digitclassifier

import android.content.Context
import android.content.res.AssetManager
import android.graphics.Bitmap
import android.util.Log
import com.google.android.gms.tasks.Task
import com.google.android.gms.tasks.Tasks.call
import org.tensorflow.lite.Interpreter
import java.io.FileInputStream
import java.io.IOException
import java.nio.ByteBuffer
import java.nio.ByteOrder
import java.nio.channels.FileChannel
import java.util.concurrent.Callable
import java.util.concurrent.ExecutorService
import java.util.concurrent.Executors


class DigitClassifier(private val context: Context) {
  // TODO: Add a TF Lite interpreter as a field.
  private var interpreter: Interpreter? = null
  var isInitialized = false
  private set

          /** Executor to run inference task in the background. */
          private val executorService: ExecutorService = Executors.newCachedThreadPool()

  private var inputImageWidth: Int = 0 // will be inferred from TF Lite model.
  private var inputImageHeight: Int = 0 // will be inferred from TF Lite model.
  private var modelInputSize: Int = 0 // will be inferred from TF Lite model.

  fun initialize(): Task<Void> {
    return call(
      executorService,
      Callable<Void> {
        initializeInterpreter()
        null
      }
    )
  }

  @Throws(IOException::class)
  private fun initializeInterpreter() {
    // TODO: Load the TF Lite model from file and initialize an interpreter.
    val assetManager = context.assets
    val model = loadModelFile(assetManager, "mnist.tflite")

    // Initialize TF Lite Interpreter with NNAPI enabled.
    val options = Interpreter.Options()
    options.setUseNNAPI(true)
    val interpreter = Interpreter(model, options)
```

```
    // TODO: Read the model input shape from model file.
    val inputShape = interpreter.getInputTensor(0).shape()
    inputImageWidth = inputShape[1]
    inputImageHeight = inputShape[2]
    modelInputSize = FLOAT_TYPE_SIZE * inputImageWidth * inputImageHeight * PIXEL_SIZE

    this.interpreter = interpreter

    isInitialized = true
    Log.d(TAG, "Initialized TFLite interpreter.")
  }

  @Throws(IOException::class)
  private fun loadModelFile(assetManager: AssetManager, filename: String): ByteBuffer {
    val fileDescriptor = assetManager.openFd(filename)
    val inputStream = FileInputStream(fileDescriptor.fileDescriptor)
    val fileChannel = inputStream.channel
    val startOffset = fileDescriptor.startOffset
    val declaredLength = fileDescriptor.declaredLength
    return fileChannel.map(FileChannel.MapMode.READ_ONLY, startOffset, declaredLength)
  }

  private fun classify(bitmap: Bitmap): String {
    check(isInitialized) { "TF Lite Interpreter is not initialized yet." }

    // TODO: Add code to run inference with TF Lite.
// Preprocessing: resize the input image to match the model input shape.
    val resizedImage = Bitmap.createScaledBitmap(
      bitmap,
      inputImageWidth,
      inputImageHeight,
      true
    )
    val byteBuffer = convertBitmapToByteBuffer(resizedImage)

    // Define an array to store the model output.
    val output = Array(1) { FloatArray(OUTPUT_CLASSES_COUNT) }

// Run inference with the input data.
    interpreter?.run(byteBuffer, output)
    // Post-processing: find the digit that has the highest probability
// and return it a human-readable string.
    val result = output[0]
    val maxIndex = result.indices.maxBy { result[it] } ?: -1
    val resultString = "Prediction Result: %d\nConfidence: %2f".
      format(maxIndex, result[maxIndex])

    return resultString
  }

  fun classifyAsync(bitmap: Bitmap): Task<String> {
    return call(executorService, Callable<String> { classify(bitmap) })
  }

  fun close() {
    call(
      executorService,
      Callable<String> {
        // TODO: close the TF Lite interpreter here
        interpreter?.close()

        Log.d(TAG, "Closed TFLite interpreter.")
        null
      }
    )
  }

  private fun convertBitmapToByteBuffer(bitmap: Bitmap): ByteBuffer {
    val byteBuffer = ByteBuffer.allocateDirect(modelInputSize)
```

```
    byteBuffer.order(ByteOrder.nativeOrder())

    val pixels = IntArray(inputImageWidth * inputImageHeight)
    bitmap.getPixels(pixels, 0, bitmap.width, 0, 0, bitmap.width, bitmap.height)

    for (pixelValue in pixels) {
      val r = (pixelValue shr 16 and 0xFF)
      val g = (pixelValue shr 8 and 0xFF)
      val b = (pixelValue and 0xFF)

      // Convert RGB to grayscale and normalize pixel value to [0..1].
      val normalizedPixelValue = (r + g + b) / 3.0f / 255.0f
      byteBuffer.putFloat(normalizedPixelValue)
    }

    return byteBuffer
  }

  companion object {
    private const val TAG = "DigitClassifier"

    private const val FLOAT_TYPE_SIZE = 4
    private const val PIXEL_SIZE = 1

    private const val OUTPUT_CLASSES_COUNT = 10
  }
}
```

OUTPUT: