Attendance Mate – Android attendance system using machine learning.

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Abstract

In today's world, the use of technology has become indispensable in various fields, including education. One of the critical aspects of education is attendance management, which is traditionally done manually. However, manual attendance management systems are time-consuming and prone to errors, leading to inaccuracies and inefficiencies in the attendance recording process. To overcome these challenges, this project proposes an Android attendance app that leverages artificial neural networks to automate and improve attendance management.

The Android attendance app uses a machine learning algorithm, specifically an artificial neural network, to identify and authenticate students. The application captures images of the students' faces and stores them in a database for future reference. When the student arrives for class, the app captures an image of their face and compares it with the images in the database. If the app identifies the student, it marks the attendance as present. The app also includes a feature for adding and deleting students, viewing attendance reports, and exporting data.

The proposed Android attendance app offers several advantages over traditional manual attendance management systems. First, it eliminates the need for manual data entry, reducing the time and effort required to record attendance. Second, it improves accuracy and efficiency by eliminating errors associated with manual attendance management. Finally, it provides real-time attendance data, enabling teachers to monitor attendance in real time and take appropriate actions to improve student performance.

The project demonstrates the potential of artificial neural networks in developing innovative solutions to complex problems. The proposed Android attendance app can be extended to other domains, such as employee attendance management, event management, and access control systems. Overall, the Android attendance app is a significant step forward in automating attendance management and improving the overall efficiency and effectiveness of the education system.

Key Terms: Android application development - Machine learning - Artificial neural networks - Data preprocessing - Feature extraction - Feature selection

Introduction

Attendance tracking is a crucial aspect of any organization, whether it's an educational institution, corporate office, or any other workplace. Keeping track of employees' or students' attendance manually is a tedious and time-consuming task. However, with the advancement of technology, attendance tracking has become more streamlined and efficient. One such technological solution is the use of an Android attendance system.

An Android attendance system is a mobile application that enables users to mark their attendance using their mobile devices. The system is designed to simplify the attendance tracking process by eliminating the need for manual entry and reducing the chances of errors. The Android attendance system uses various technologies like Artificial Neural Networks, Machine Learning, and biometric identification to accurately identify and track the attendance of users.

This system offers several benefits over traditional attendance tracking methods, including real-time tracking, accurate data, and remote access. It is particularly useful in educational institutions where attendance tracking is critical for assessing student performance and maintaining records.

In this project, we aim to develop an Android attendance system that uses a combination of Machine Learning algorithms and biometric identification to accurately track attendance. The system will be designed to be user-friendly, secure, and scalable, ensuring that it can be used in a variety of settings. The project will involve the development of a mobile application and the integration of various technologies to create a robust and reliable attendance tracking system.

Literature Survey""

The paper "Contactless Attendance System based on Face Recognition" by Shubham Kadam and , Sagar Khedkar in 2021. Investigation of face recognition has stayed an endeavoring region for scientists for a long time. There are many existing strategies for face detection and recognition, which can classify the given face image by comparing with trained face images. Literature review results the way that Haar Cascade is reliable in all papers concentrated as it gives great detection rate whereas LBPH beats different algorithms with a superior recognition rate and a low bogus positive rate. The ordinary techniques are touchy to lighting, act, brightening

because of which exactness of face detection and recognition to some degree debases subsequently connecting for profound learning with the assistance of convolution neural network to fulfill the requirement for the application.

The paper "Smart Attendance Monitoring System (SAMS): A Face Recognition based Attendance System for Classroom Environment" by Shubhobrata Bhattacharya, Gowtham Sandeep Nainala, Prosenjit Das and Aurobinda Routray in 2018. It provided an An automatic attendance management system aims at solving the issues of manual methods of existing systems. We have used the concept of face recognition to implement a system that marks the attendance of a particular person by detecting and recognizing the face. These systems perform satisfactorily with different facial expressions, lighting and pose of the person. There is room for improvement since these systems sometimes fail to recognize every face student present in the classroom. We have made the device portable for easy use even when the sessions are on, without disturbing the class. There are future scopes to make a more compact ergonomics to make it a more user-friendly product to make an impact in building a more healthier academic environment.
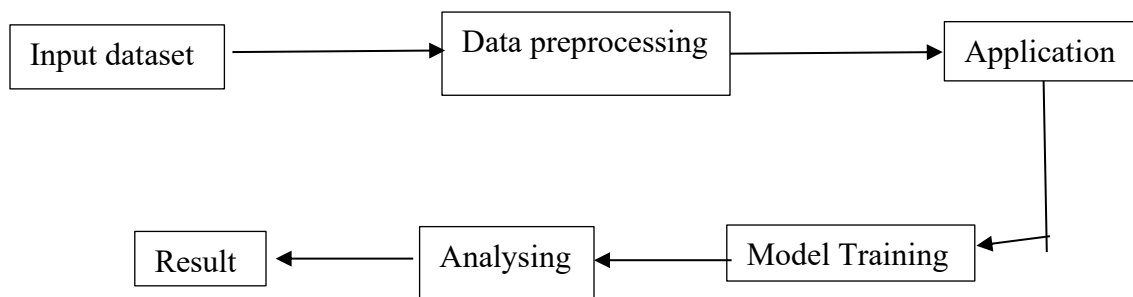
Methodology

The methodology for developing the Android attendance system involved the following steps:

1. **Requirement Analysis**: The first step was to gather and analyze the requirements of the system. This involved understanding the needs of the users and identifying the key features that the system should have.

2. **System Design:** Based on the requirements, the system was designed to have a user-friendly interface with features such as attendance recording, viewing attendance records, and generating reports. The system design also included the selection of appropriate algorithms for face detection and recognition.

3. **Database Design:** The next step was to design the database schema to store the attendance data. The database was designed to ensure data integrity and minimize redundancy.

4. **Implementation:** After the system design and database schema were finalized, the system was implemented using the Android Studio IDE. The system was developed in Java and integrated with a MySQL database.

5. **Testing:** The system was tested to ensure that it met the user requirements and was functioning as expected. The testing involved both functional and non-functional testing to ensure that the system was reliable, efficient, and secure.

6. **Deployment:** After testing, the system was deployed to a production

environment. This involved installing the system on Android devices and setting up the database on a server.

7. **Maintenance:** Finally, the system was handed over to the client with documentation and maintenance support. Any issues or bugs discovered during the maintenance phase were addressed promptly to ensure the system continued to function effectively.

```
Input dataset ───────────▶ Data preprocessing ───────────▶ Application
                                                                 │
                                                                 ▼
Result ◀─────── Analysing ◀─────── Model Training ◀──────────────┘
```

IMPLEMENTATION

Importing Library Files:

import java.util.ArrayList;
import java.util.Calendar;

import com.android.attendance.bean.AttendanceBean;
import com.android.attendance.bean.AttendanceSessionBean;
import com.android.attendance.bean.FacultyBean;
import com.android.attendance.bean.StudentBean;
import com.android.attendance.context.ApplicationContext;
import com.android.attendance.db.DBAdapter;
import com.example.androidattendancesystem.R;

```java
import android.app.Activity;
import android.app.DatePickerDialog;
import android.app.Dialog;
import android.content.Intent;
import android.graphics.Color;
import android.os.Bundle;
import android.text.TextUtils;
import android.view.Menu;
import android.view.View;
import android.view.View.OnClickListener;
import android.widget.AdapterView;
import android.widget.AdapterView.OnItemSelectedListener;
import android.widget.ArrayAdapter;
import android.widget.Button;
import android.widget.DatePicker;
import android.widget.EditText;
import android.widget.ImageButton;
import android.widget.Spinner;
import android.widget.TextView;
import android.widget.Toast;

public class AddAttandanceSessionActivity<AddAttandanceActivity>
extends Activity {

        private ImageButton date;
        private Calendar cal;
        private int day;
        private int month;
        private int dyear;
        private EditText dateEditText;
        Button submit;
        Button viewAttendance;
        Button viewTotalAttendance;
        Spinner spinnerbranch,spinneryear,spinnerSubject;
        String branch = "cse";
        String year = "SE";
        String subject = "SC";

        private String[] branchString = new String[] { "cse"};
        private String[] yearString = new String[] {"SE","TE","BE"};
        private String[] subjectSEString = new String[] {"SC","MC"};
        private String[] subjectTEString = new String[] {"GT","CN"};
        private String[] subjectBEString = new String[] {"DS","NS"};

        private String[] subjectFinal = new String[]
{"M3","DS","M4","CN","M5","NS"};
```

```java
        AttendanceSessionBean attendanceSessionBean;

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

                //Assume subject will be SE
                //subjectFinal = subjectSEString;

                spinnerbranch=(Spinner)findViewById(R.id.spinner1);
                spinneryear=(Spinner)findViewById(R.id.spinneryear);
                spinnerSubject=(Spinner)findViewById(R.id.spinnerSE);

                ArrayAdapter<String> adapter_branch = new
ArrayAdapter<String>(this,android.R.layout.simple_spinner_item,
branchString);

        adapter_branch.setDropDownViewResource(android.R.layout.si
mple_spinner_dropdown_item);
                spinnerbranch.setAdapter(adapter_branch);
                spinnerbranch.setOnItemSelectedListener(new
OnItemSelectedListener() {
                        @Override
                        public void onItemSelected(AdapterView<?>
arg0, View view,
                                        int arg2, long arg3) {
                                // TODO Auto-generated method stub
                                ((TextView)
arg0.getChildAt(0)).setTextColor(Color.WHITE);
                                branch =(String)
spinnerbranch.getSelectedItem();
                        }

                        @Override
                        public void onNothingSelected(AdapterView<?>
arg0) {
                                // TODO Auto-generated method stub
                        }
                });

                ///.....................spinner2
                ArrayAdapter<String> adapter_year = new
ArrayAdapter<String>(this, android.R.layout.simple_spinner_item,
yearString);

        adapter_year.setDropDownViewResource(android.R.layout.simpl
```

```java
e_spinner_dropdown_item);
            spinneryear.setAdapter(adapter_year);
            spinneryear.setOnItemSelectedListener(new
OnItemSelectedListener() {
                @Override
                public void onItemSelected(AdapterView<?>
arg0, View view,
                        int arg2, long arg3) {
                    // TODO Auto-generated method stub
                    ((TextView)
arg0.getChildAt(0)).setTextColor(Color.WHITE);
                    year =(String)
spinneryear.getSelectedItem();
                    Toast.makeText(getApplicationContext(),
"year:"+year, Toast.LENGTH_SHORT).show();

                    /*if(year.equalsIgnoreCase("se"))
                    {
                        subjectFinal = subjectSEString;
                    }
                    else if(year.equalsIgnoreCase("te"))
                    {
                        subjectFinal = subjectTEString;
                    }
                    else if(year.equalsIgnoreCase("be"))
                    {
                        subjectFinal = subjectBEString;
                    }*/

                }

                @Override
                public void onNothingSelected(AdapterView<?>
arg0) {
                    // TODO Auto-generated method stub
                }
            });

        ArrayAdapter<String> adapter_subject = new
ArrayAdapter<String>(this, android.R.layout.simple_spinner_item,
subjectFinal);

    adapter_subject.setDropDownViewResource(android.R.layout.simple_spinner_dropdown_item);
            spinnerSubject.setAdapter(adapter_subject);
            spinnerSubject.setOnItemSelectedListener(new
OnItemSelectedListener() {
```

```
                    @Override
                    public void onItemSelected(AdapterView<?>
arg0, View view,
                            int arg2, long arg3) {
                    // TODO Auto-generated method stub
                    ((TextView)
arg0.getChildAt(0)).setTextColor(Color.WHITE);
                            subject =(String)
spinnerSubject.getSelectedItem();

                    }

                    @Override
                    public void onNothingSelected(AdapterView<?>
arg0) {
                            // TODO Auto-generated method stub
                    }
            });


            date = (ImageButton)
findViewById(R.id.DateImageButton);
            cal = Calendar.getInstance();
            day = cal.get(Calendar.DAY_OF_MONTH);
            month = cal.get(Calendar.MONTH);
            dyear = cal.get(Calendar.YEAR);
            dateEditText = (EditText)
findViewById(R.id.DateEditText);
            date.setOnClickListener(new OnClickListener() {

                    @Override
                    public void onClick(View arg0) {
                            showDialog(0);

                    }
            });

            submit=(Button)findViewById(R.id.buttonsubmit);
            submit.setOnClickListener(new OnClickListener() {

                    @Override
                    public void onClick(View arg0) {

                            AttendanceSessionBean
attendanceSessionBean = new AttendanceSessionBean();
                            FacultyBean
bean=((ApplicationContext)AddAttandanceSessionActivity.this.getAppli
```

cationContext()).getFacultyBean();

```
        attendanceSessionBean.setAttendance_session_faculty_id(bean.g
etFaculty_id());

        attendanceSessionBean.setAttendance_session_department(branc
h);

        attendanceSessionBean.setAttendance_session_class(year);

        attendanceSessionBean.setAttendance_session_date(dateEditText
.getText().toString());

        attendanceSessionBean.setAttendance_session_subject(subject);

                        DBAdapter dbAdapter = new
DBAdapter(AddAttandanceSessionActivity.this);
                        int sessionId=
        dbAdapter.addAttendanceSession(attendanceSessionBean);

                        ArrayList<StudentBean>
studentBeanList=dbAdapter.getAllStudentByBranchYear(branch, year);

        ((ApplicationContext)AddAttandanceSessionActivity.this.getApp
licationContext()).setStudentBeanList(studentBeanList);


                        Intent intent = new
Intent(AddAttandanceSessionActivity.this,AddAttendanceActivity.class)
;
                        intent.putExtra("sessionId", sessionId);
                        startActivity(intent);
                }
            });


        viewAttendance=(Button)findViewById(R.id.viewAttendancebut
ton);
                viewAttendance.setOnClickListener(new
OnClickListener() {

                        @Override
                        public void onClick(View arg0) {

                                AttendanceSessionBean
attendanceSessionBean = new AttendanceSessionBean();
```

```
                    FacultyBean
bean=((ApplicationContext)AddAttandanceSessionActivity.this.getAppli
cationContext()).getFacultyBean();


        attendanceSessionBean.setAttendance_session_faculty_id(bean.g
etFaculty_id());

        attendanceSessionBean.setAttendance_session_department(branc
h);

        attendanceSessionBean.setAttendance_session_class(year);

        attendanceSessionBean.setAttendance_session_date(dateEditText
.getText().toString());

        attendanceSessionBean.setAttendance_session_subject(subject);

                    DBAdapter dbAdapter = new
DBAdapter(AddAttandanceSessionActivity.this);

                    ArrayList<AttendanceBean>
attendanceBeanList =
dbAdapter.getAttendanceBySessionID(attendanceSessionBean);

        ((ApplicationContext)AddAttandanceSessionActivity.this.getApp
licationContext()).setAttendanceBeanList(attendanceBeanList);

                    Intent intent = new
Intent(AddAttandanceSessionActivity.this,ViewAttendanceByFacultyAc
tivity.class);
                    startActivity(intent);

                }
            });


        viewTotalAttendance=(Button)findViewById(R.id.viewTotalAtte
ndanceButton);
                viewTotalAttendance.setOnClickListener(new
OnClickListener() {

                    @Override
                    public void onClick(View arg0) {
                            AttendanceSessionBean
attendanceSessionBean = new AttendanceSessionBean();
                            FacultyBean
```

```java
bean=((ApplicationContext)AddAttandanceSessionActivity.this.getAppli
cationContext()).getFacultyBean();


        attendanceSessionBean.setAttendance_session_faculty_id(bean.g
etFaculty_id());

        attendanceSessionBean.setAttendance_session_department(branc
h);

        attendanceSessionBean.setAttendance_session_class(year);

        attendanceSessionBean.setAttendance_session_subject(subject);

                            DBAdapter dbAdapter = new
DBAdapter(AddAttandanceSessionActivity.this);

                            ArrayList<AttendanceBean>
attendanceBeanList =
dbAdapter.getTotalAttendanceBySessionID(attendanceSessionBean);

        ((ApplicationContext)AddAttandanceSessionActivity.this.getApp
licationContext()).setAttendanceBeanList(attendanceBeanList);

                            Intent intent = new
Intent(AddAttandanceSessionActivity.this,ViewAttandanceByFacultyAc
tivity.class);
                            startActivity(intent);


                }
            });
        }
        @Override
        @Deprecated
        protected Dialog onCreateDialog(int id) {
                return new DatePickerDialog(this, datePickerListener,
dyear, month, day);
        }
        private DatePickerDialog.OnDateSetListener datePickerListener
= new DatePickerDialog.OnDateSetListener() {
                public void onDateSet(DatePicker view, int selectedYear,
                        int selectedMonth, int selectedDay) {
                    dateEditText.setText(selectedDay + " / " +
(selectedMonth + 1) + " / "
                            + selectedYear);
                }
        };
```
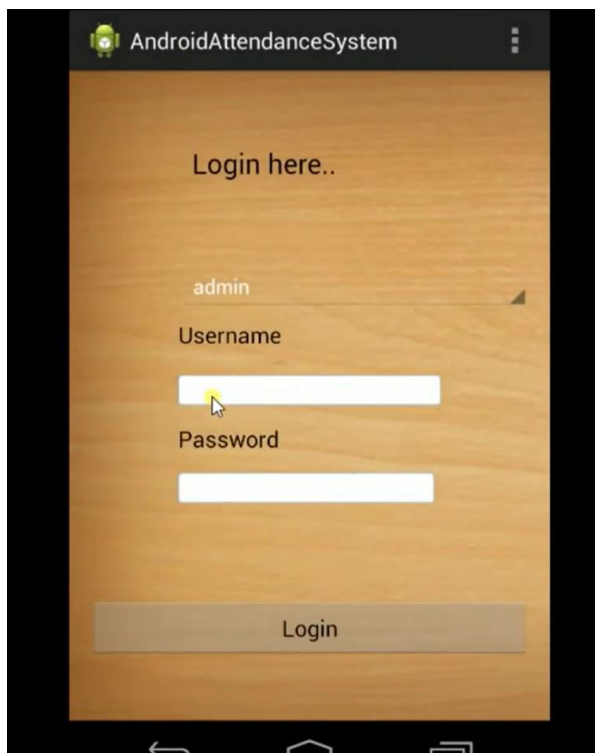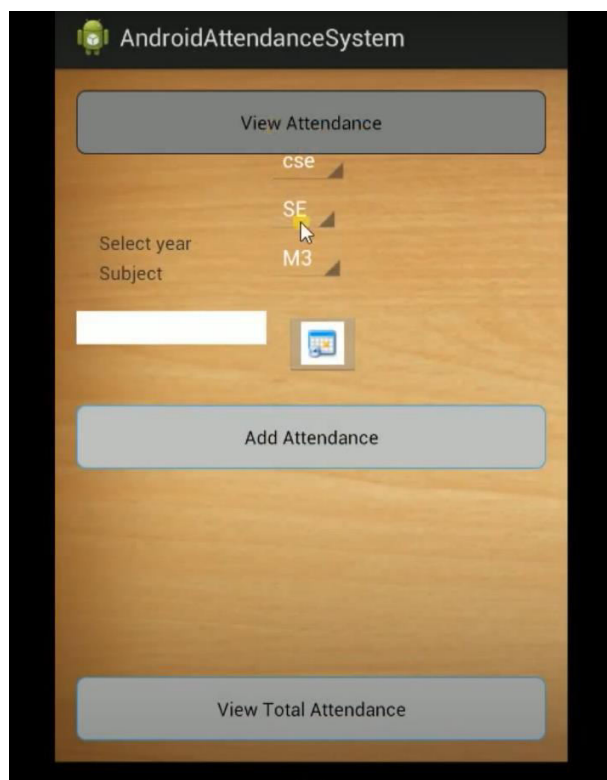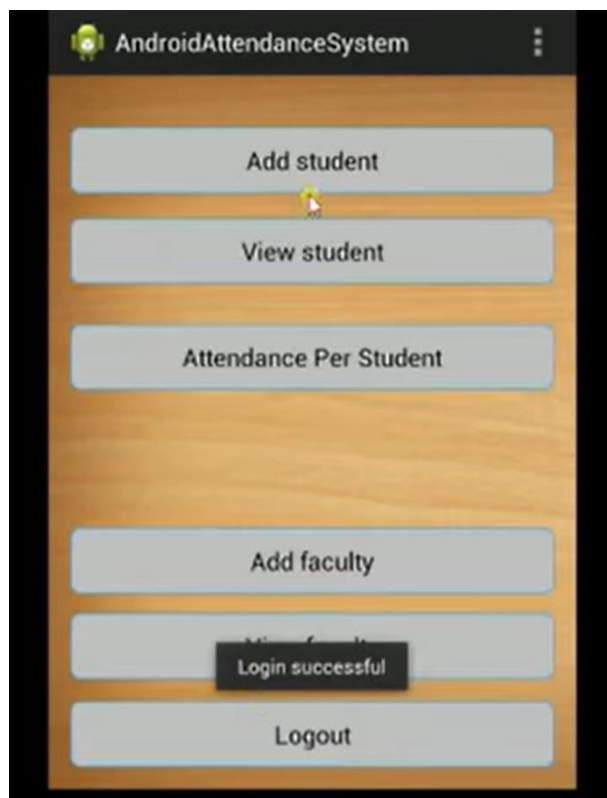
}

SNAPSHOTS

CONCLUSION

The data suggests that the app has helped to improve attendance rates and make attendance-taking more efficient and accurate.

We can use these findings to inform future policies and practices related to attendance monitoring and student engagement.

In conclusion, the development of an Android Attendance System App for students is a significant project that aims to simplify and streamline the attendance-taking process in educational institutions.

FUTURE ENHANCEMENTS

The project demonstrates the feasibility and effectiveness of using mobile technology to streamline the attendance-taking process in educational institutions.

In future, the same project can be extended by randomized code algorithm.

This algorithm can be used to generate a unique code for each class session that students must enter to confirm their attendance. The app can generate a new code for each session, which reduces the risk of fraudulent check-ins.

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I had attended many Workshops, Seminars in Java and did paper presentation. I'm fervent in techs, I've completed data analytics course with the real time projects. I've created three websites. I'm intense in creating great things.

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