Design and Implementation of Primary School Students' Oral Arithmetic System Based on Android Technology

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Abstract. This paper introduces the importance of cultivating pupils' oral arithmetic ability. This paper designs and realizes students' score management system based on Java technology. The system can automatically give oral arithmetic questions. When users answer questions, it can automatically judge whether the answers are correct or not, and put the questions they have done into the combo box for users to review.

Keywords: oral arithmetic; test; Android; event handling.

1. Introduction
Oral calculation is an important part of computational ability. It is not only the basis of calculation, but also the important content of cultivating students' logical thinking ability and oral expression ability. Oral arithmetic can develop pupils' memory, improve pupils' thinking flexibility, and cultivate pupils' analogy ability. The cultivation of oral arithmetic ability is particularly prominent in the teaching of lower grades of primary school students.

2. Knowledge of Android Used In the Application

2.1. Interface Design
The Android mobile application uses components including Button, EditText and TextView in the interface design.

2.2. Event Response
When the "Show Topics for Exercises" button is clicked, the member method show () in MainCalculator.java is automatically called, which shows topics for exercises.

When the "Judge" button is clicked, the member method decide () in MainCalculator.java is automatically called, which judge whether the answer is correct or not.

A click event can be triggered by the Button component. To handle the click event of the "Show Topics for Exercises" button in MainCalculator.java are the following steps:

(1) In MainCalculator.java, one object of the Button class is declared as "problem", and the object declared as "problem" is relevant to the component whose id is problem on the interface. For instance:

```java
Button problem;  //the object problem of class Button
problem=(Button)findViewById(R.id.problem);  //corresponding to interface component problem
```

In the file named test.xml,

```xml
<Button
```
android:id="@+id/problem"
android:text="Show Topics for Exercises"
android:onClick="show"
 />

The id of Button is is declared as "problem" in the layout file named test.xml.
(2) add the listener.
In the file named test.xml, an attribute is added into the Button component :
android:onClick="show"

When the "Show Topics for Exercises" Button is clicked, the show( ) member method in the
MainCalculator.java is automatically called.
(3) The member method show( ) displays topics for exercises in MainCalculator.java.
To handle the click event of the "Judge" button in MainCalculator.java are the following steps:
(1) In MainCalculator.java, one object of the Button class is declared as "judge", and the object
declared as "judge" is relevant to the component whose id is problem on the interface. For instance:
Button judge;
judge=(Button)findViewById(R.id.judge);

In the file named test.xml,
<Button
    android:id="@+id/judge"
    android:text="Judge"
    android:onClick="decide"
 />

In the layout file named test.xml, the id of Button is "judge".
(2) add the listener.
In the file named test.xml, an attribute is added into the Button component :
android:onClick="decide"

When the "Judge" Button is clicked, the decide( ) member method is automatically called in the
MainCalculator.java.
(3) The member method decide( ) judge whether the answer is correct or not in MainCalculator.java.

3. Implementation of Primary School Students’ Oral Arithmetic System Based on Android Technology
(1) Interface of the system, the file name is test.xml.
The id property of of the first Button is "problem". The text property of of the first Button is "Show Topics for Exercises". The onClick property of of the first Button is "show".
The id property of the first EditText is "text1". And the inputType property of the first EditText is "numberDecimal".
The id property of the first TextView is "labela". And the text property of the first TextView is "+".
The id property of the second EditText is "text2". And the inputType property of the second EditText is "numberDecimal".
The id property of the second TextView is "label2". And the text property of the second TextView is "=".
The id property of the third EditText is "text3". And the inputType property of the third EditText is "numberDecimal".
The id property of the third TextView is "label3". And the text property of the second TextView is " ".
The id property of of the second Button is "judge". The text property of of the second Button is "Judge". The onClick property of of the second Button is "decide".
The id property of the fourth TextView is "label4". And the text property of the fourth TextView is "Correctness Rate= ".
The id property of of the fifth Button is "label5". And the text property of of the fifth Button is "".
The id property of the sixth TextView is "label6". And the text property of the sixth TextView is "Exercises Done".
The id property of the Spinner is "collection". The entries property of the Spinner is "@array/exercises_list".
The id property of the seventh TextView is "textView1". And the text property of the seventh TextView is "".
The id property of the third Button is "exit". The text property of the third Button is "Exit". The onClick property of the third Button is "quit".

(2) event handlers, MainCalculator.java
package com.example.calculate2;
import android.app.Activity;
import android.os.Bundle;
import android.view.View;
import android.widget.*;
import android.content.Intent;
import java.util.ArrayList;
import android.widget.ArrayAdapter;
public class MainCalculator extends Activity {
    EditText text1,text2,text3;
    TextView labela,label3,label4;
    Button problem,judge;
    Spinner collection;
    ArrayList<String> list ;
    int a,b,right_answer,answer,op,temp;
    float p,right,total;
    String s1=" ";
    @Override
    protected void onCreate(Bundle savedInstanceState) {
        super.onCreate(savedInstanceState);
        setContentView(R.layout.test);
        text1 = (EditText)findViewById(R.id.text1);
        text2 = (EditText)findViewById(R.id.text2);
        text3 = (EditText)findViewById(R.id.text3);
        labela=(TextView)findViewById(R.id.labela);
        label3=(TextView)findViewById(R.id.label3);
        label4=(TextView)findViewById(R.id.label4);
        problem=(Button)findViewById(R.id.problem);
        judge=(Button)findViewById(R.id.judge);
        collection=(Spinner)findViewById(R.id.collection);
        list = new ArrayList<String>();
        ArrayAdapter<String> adapter = new ArrayAdapter<String>(this,R.layout.item,
R.id.text,list);
        collection.setAdapter(adapter);

    }

    public void show(View view){
        text1.setText(" ");
        text2.setText(" ");
        text3.setText(" ");
        label3.setText(" ");
        String s1=" ";
        a=(int)(Math.random()*100)+1;
        b=(int)(Math.random()*100)+1;
    }
}
op=(int)(Math.random() * 2);
if(op<1)
{
    labela.setText("+");
text1.setText(String.valueOf(a));
text2.setText(String.valueOf(b));
    right_answer=a+b;
s1=(a+"+"+b+"=");
}
else
{
    labela.setText("-");
if(a<b)
{
    temp=a;
    a=b;
    b=temp;
}
text1.setText(String.valueOf(a));
text2.setText(String.valueOf(b));
    right_answer=a-b;
s1=(a+"-"+b+"=");
}
}
public void decide(View view)
{
    total++;
    String s2=" ";
s2=text3.getText().toString();
    answer=Integer.parseInt(s2.trim());
    if(right_answer==answer)
    { label3.setText("√");
        right++;
        s1=s1+(String.valueOf(answer))+(" √");
        list.add(s1);
    }
    else
    { label3.setText("×");
        s1=s1+(String.valueOf(answer))+(" ×");
        list.add(s1);
    }
    p=(right/total)*100;
    String s3=String.format("%.2f", p);
    label4.setText("Correctness Rate="+s3+"%");
}
public void quit(View view)
{
    Intent intent = new Intent(Intent.ACTION_MAIN);
    intent.addCategory(Intent.CATEGORY_HOME);
    intent.setFlags(Intent.FLAG_ACTIVITY_CLEAR_TOP);
    startActivity(intent);
    android.os.Process.killProcess(android.os.Process.myPid());
}
4. The Calculator Running Effect Demo
When the user click on the "Show Topics for Exercises" button, the question will appear automatically. The user input the result of the calculation, and then click the "Judge" button, it can immediately determine whether the answer is correct, and put the calculated question and answer into the combo box, as shown in Figure 1.

(a) the answer is correct

(b) the answer is wrong
Fig. 1. Initial Running results after input data

(c) the questions and the answers shown in the combo box

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