Degree Final Project Thesis

GAME revolution. Last trends in games and their implementation in an Android Mobile APP

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The project is built around Mobile Games. The core part of the project is the implementation of a Game APP, created with the knowledge. The name of the game is Guess The Year, and it is about a quiz in which you have to guess the year of some historical facts. It has some interesting game elements implemented, such as points, time, and a progress bar with your result.

In this document you will first find an overview explanation of what games are and how to design one of them. Additionally, an extensive investigation of the current status of mobile games market will be included. This information will be later used to build the APP.

Moreover, you will be able to see the process of creating the app. Since the idea of the game was generated until the testing was done, going through the app specification, its design and its implementation. Then, it will be shown how the marketing strategy was set. To conclude, the results it got in Google Play will be analysed.
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1. INTRODUCTION

Mobile Games Market has improved a lot during the last 10 years. The introduction of smartphones and tablet, created a market in which everybody is able to succeed, but gathers a huge competence. And as the format and the profile of the user is so different, we have seen a tendency of videogames that were completely different from the traditional ones. In the work presented in this thesis, some of these tendencies will be analysed, as well as the mobile market state and growth prediction for the following years.

Additionally, it was important to apply all this information in a practical part related my degree, Telematics engineering. The way to do it was a Mobile Game. There are plenty of ways to program a Game: Unity3D, Cocos2D, Objective C... but I decided to do it with Android as I had some experience with it, and it was a very clean way to do it. Android is the mobile OS used by more people, and lots of developers are working on it to make it a reference in technology in the future decades.

In order to make the best game possible, the basics of game design will be studied. Nowadays, lots of people are working on this issue, and there are some important gurus. For example, David Jaffe and Will Wright. Some techniques they use will be gathered in this thesis, taken from books they have written.

1.1. Objectives

- Analyse the last trends in Mobile Games Market through a market study.
- Learn about game design in order to make a successful game.
- Learn Android programming as well as Java and XML.
- Implement an Android Game. The Game should pass performance testing and fragmentation testing.
- Set a marketing strategy and analyse the results.

1.2. Project Context

This project is the final Project from my Telematics Engineering degree.

The project has been done in the software school of Tongji University and supervised from UPC (Universitat Politècnica de Catalunya).

1.3. Contact information

I have done the project alone, with the supervision of: Luo Yigui, from Tongji University and Juan Luis Gorricho, from UPC.

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2. GAMES AND VIDEOGAMES

2.1. GAMES. An overview

2.1.1. What is a game?

game /gām/ n. (pl. -games) a series of interesting choices in which players interact with each other toward a trivial goal.

Games have the particularity that you don’t need to do it, but for fun, you try to overcome some obstacles. So playing games would be a voluntary effort to overcome unnecessary obstacles.

![Figure 1. The card players, from Paul Cézanne](image)

Other elements that define games are:

i) **Rules.** They are a set of instructions that characterize the game that the players agree to respect. If they infract them, they can have a penalty.

ii) There is one **objective.** The more the player is willing to overcome the objective the funnier the game is.

iii) **Victory Condition.** In every game the user tries to overcome the objective. When they do
it, they have a state of satisfaction.

iv) Skill, Strategy and chance. These are the things that make you win or lose.

2.1.2. Kind of games

i) Board Games

A board game is a game that involves counters or pieces moved or placed on a pre-marked surface or "board", according to a set of rules. Games can be based on pure strategy, chance (e.g. rolling dice), or a mixture of the two, and usually have a goal that a player aims to achieve.

Mangala or chess are really old games, while there are more recent ones, such as Trivial or Monopoly.

ii) Card Games

The design of card games is constricted by the type of the deck of cards. The most popular deck is the called “standard” or “poker” one, as one of the most famous game, poker, is played with these cards.
iii) Casino Games

The central aim of casino game design is to optimize the house advantage and maximize revenue from gamblers. From the player point of view, their aim is to make more money from their current money, with the risk of losing it.

There are lots of studies involving casino games, as it is a market where lot of money is made.

iv) Role-Playing games

Role-Playing games are those in which players assume the roles of characters in a fictional setting. Players take responsibility for acting out these roles within a narrative, either through literal acting or through a process of structured decision-making or character development. Actions taken within many games succeed or fail according to a formal system of rules and guidelines.

v) Sports

Sports are games that involve some physical activity and ability. They have an element of competition, what makes it exciting. Sports have existed for a long time, and nowadays lots of money is around the sports market.
vi) Video games

2.2. Videogames

2.2.1. Definition of Videogames

A video game is an electronic game that involves human interaction with a user interface to generate visual feedback on a video device.

The electronic systems used to play video games are known as platforms; examples of these are personal computers and video game consoles. These platforms range from large mainframe computers to small handheld devices.

2.2.2. Kind of Videogames

It is kind of difficult to gather all the different videogames types, but these are some of the most important ones.

i) Sandbox (Minecraft, GTA).
ii) Simulation (Civilization, SimCity, Farmville)
iii) Social Building (The Sims)
iv) MMOGs (World of Warcraft)
v) Puzzle (Angry birds, Candy Crush)
vi) Sports (Fifa, NBA 2k)
vii) Adventure (Crash Bandicoot, Uncharted)
viii) Shooter (Call of Duty)
ix) Party game (Singstar, buzz)
x) Educational game (Pipo, Memrise)
xi) Platforms (Super Mario)
xii) Racing (Mario Kart, Gran Turismo)
xiii) Arcade (Tetris, 2048).
3. **GAME DESIGN**

3.1. What is game design?

Game design is the process of designing the content and rules of a game in the pre-production stage and design of gameplay, environment, storyline, and characters during production stage.

The designer of a game is very much like the director of a film; the designer is the visionary of the game and controls the artistic and technical elements of the game in fulfilment of their vision.

3.2. What is fun?

In games fun is very important. That’s why lots of people have investigated around that issue.

3.2.1. *Mark LeBlanc classification of fun*

Designer Marc LeBlanc breaks down fun into eight categories.

- a. Sensation
- b. Fellowship
- c. Fantasy
- d. Discovery
- e. Narrative
- f. Expression
- g. Challenge
- h. Submission
3.2.2. The Un-fun theory

“Start with a fun idea. While designing, when you find something that is not fun, remove it. All that should be left is the fun”.

3.3. Game Elements

There are some elements in games that are essential in case you want to have a successful game.

These are some:

+ **Challenge.** It is a task that tests someone’s abilities. If the challenge is overcome, the winning condition will be obtained.

+ **Levels.** Dividing the game into levels will encourage the player to keep on playing as he will have an incentive to keep improving.

+ **Team.** As in sports, playing in a team is something that player enjoys. Online games allow people to work with their friends and even make new friends, which can be a very satisfactory issue.

+ **Reward.** The reward is something given for the winning condition. This makes the challenge more appealing.

+ **Badges.** A special kind of reward. They are usually given when the player does a significant achievement.

3.4. Game Design Documents

For designing games there are some common documents in the industry. These are the most important ones:

- The one sheet paper.
- Game Design Document
3.4.1. *The one sheet paper*

This is a document used to show the investors and possible workers how the game is going to be. It is like the one-minute speech for start-ups. It should be able to convince anybody who reads it to work for the game.

It should contain:

- Game title
- Intended
- Target age of players
- Intended Entertainment Software rating board
- A summary of the game’s story/gameplay
- Selling points

3.4.2. *Game Design Document (GDD)*

A game design document (often abbreviated GDD) is a highly descriptive living design document of the design for a video game. It would be like the business model of a start-up.

There can be lots of sections depending on the game, but the most important ones, and the ones that must always be there are:

- Story
- Characters
- Level/environment design
- Gameplay
- Art
- Sound and Music
- User Interface, Game Controls
4. **MARKET STUDY OF MOBILE VIDEOGAMES (2014)**

4.1. China is a world power in mobile game market

By 2014 China is almost going to reach the revenue done in the US. This year it is going to surpass US in number of players.

![Image of world map showing mobile gaming revenue and user numbers for United States and China]

*Figure 6. Analysis of the revenue and number of users by 2014*

**Mobile is delivering a new generation of gamers.** Global mobile games revenue is forecast to reach US$15bn in 2018, rising at a CAGR of 9.6%. China, Japan and the US are key markets. Only advertising revenue, which is still relatively small, will grow at a faster rate within the video games segment. Rising smartphone ownership is increasing access to mobile games globally and has enabled innovation in gameplay and business models.
China is not only a world power in market size but also in the enterprise world. By 2014, Tencent will be the number one enterprise in revenue through mobile gaming.

4.2. Revenue growth in mobile gaming

*Mobile games revenue soars as more consumers are connected.* Global mobile games revenue (US$bn), Tablet active devices (mn) and Smartphone connections (mn), 2013-2018
In the following figure (given by newzoo.com) we can see how games market is evolving, with a prediction for future years. It shows that in only 5 years the revenue is going to almost triplicate 2012 amount of revenue.

From this graphic we can also see that the console and PC market is going to keep with the same revenue.
From following figure (given by AppLift and newzoo) we can see that in one year it has augmented 47.6%. If the trend continues it will reach 10 BN by 2016. That means that we shouldn’t forget tablets while designing a game.
4.3. Mobile gaming biggest enterprises

Change of Power: Tencent Number One; Apple on par with Nintendo

Newzoo’s global analysis involves a variety of resources including public and non-public company revenues. In 2013, the top ten public companies by game revenues generated 44% of global revenues. Last year, Tencent moved to the number one position with $5.3bn in annual game revenue and shows no sign of leaving the top in the years to come. Tencent’s latest quarterly results of $1.7bn, up from $1.4bn in the last quarter of 2013, indicate that it could take over 10% of the global games market in 2015, if it maintains this pace of growth.

Also illustrative of the rapid market changes is the fact that Apple generated almost identical game revenues as Nintendo in 2013: $2.4bn. In 2014, both Apple and Google are expected to generate more game software revenues through their 30% share of app store spending, than Nintendo will make from their software.
4.4. Geographic Appeal Matrix

Depending on where we want to focus our game on, we should position in one or another region.

From the following figure we can extract information about the strength of every market.

- Middle east and Africa. They don’t have a big market size (currently) but it is very easy to penetrate in the market, as there are not lots of games doing marketing campaigns there.

- Europe and US. It has a good monetization potential and market size. Good if you want to take money from purchases.

- Asia Pacific. The market size is huge and they play a lot. However, the monetization rate is not very big. It would be good for games without purchases in which the important thing are the users to generate revenue through publicity.

- Eastern Europe and Latin America. They are not middle in anything. They are not as “good” as Europe, US and Asia, but not so “bad” as Africa in terms of market size and monetization. They are easier though, as not so many games are made for them.
In another way, specifying the countries we can see the market scale and the possibility of growth in the next years. We can see that India, Russia, Brazil and Mexico are going to grow substantially.
4.5. Gamer profile

We have seen that there is a change in the tendency of the profile of the gamer due to the introduction of mobile phones and tablets. “We are all gamers now”. The change has been very remarkable with women, which represent 47% of the players nowadays.

97% of kids 12-17 years play videogames. This means that there is a strong market there. We can take profit of their willing to play to making them learn.

4.6. Marketing in games

>50% download their games from friends and family.

40% search new interesting games through app store.

25% discover new apps via social media sites

This means that we should focus in all those points in order to have more downloads.
5. INTRODUCTION TO THE APP. GUESS THE YEAR

5.1. APP idea

The APP will be an android game. The player will be supposed to guess the year when different historical facts happened. They will have just 20 seconds to guess each of them.

There will be three different categories: World history, Spanish history and Chinese history. The second and third categories have been chosen because they are the regions where I am developing my project in.

The idea is to encourage them to get the higher mark through sharing in social networks their results and through other game elements such as progress bar or points.

5.2. APP’s mission

The game’s mission is to help people know history better in a funnier way. Furthermore, it will be an educational game, so kids will be able to study with this app, encouraging their motivation.

5.3. User Characteristics

The APP is defined for two different targets.

a) 10-18 years old kid

The people in this group would use the app in order to study history as a complement of their class. They would use it in order to study in a funny and motivating way.

b) 30-60 year old people
On the other side, the other target would be an elder person, who has already been to school, but would like to reinforce their culture as a funny challenge. The age of this target group would be much wider (from 30-60 and even more).
6. APP IMPLEMENTATION

6.1. Requirement provision

These are the most important actions the user can make and its consequences.

<table>
<thead>
<tr>
<th>Input</th>
<th>Treating</th>
<th>Output</th>
</tr>
</thead>
<tbody>
<tr>
<td>The APP is opened</td>
<td>The database is created and charged.</td>
<td>The principal Screen is opened</td>
</tr>
<tr>
<td>A button from the main screen is touched</td>
<td>We take 5 facts from the database</td>
<td>GameActivity is launched.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>The game starts.</td>
</tr>
<tr>
<td>The user guesses the year</td>
<td>- The dialog information is set.</td>
<td>A dialog is launched telling the user he has been right</td>
</tr>
<tr>
<td></td>
<td>- The timer is stopped.</td>
<td></td>
</tr>
<tr>
<td>The user runs out of time</td>
<td>- The dialog information is set.</td>
<td>A dialog is launched telling the user he has been wrong</td>
</tr>
<tr>
<td>The user has done 5 different facts.</td>
<td>- FinalDialog screen information is prepared</td>
<td>FinalDialog screen is launched.</td>
</tr>
<tr>
<td></td>
<td>- The score is saved in the sharedPreferences</td>
<td></td>
</tr>
</tbody>
</table>

6.2. Runtime environment

The game will be based on android operating system and programmed natively (Java and xml). An expansion towards iOS would be referred in case investments arrived.

The default version will be Android Kit Kat (4.4). But it will be updated when an actualization comes across.
6.3. Basic design concept and processing flow

6.3.1. Launch Data-Flow

![Launch Data-Flow](image)

Figure 15. Launch Data-Flow
6.3.2. Game Data-Flow

Figure 16. Game Data-Flow
7. DESIGN

Before implementing the app, it is indispensable to design it properly. To be able to do it, I investigated about game elements and rewards.

Firstly, I designed the wireframes, and when they were approved, I followed designing all the layouts.

7.1. Wireframes

![Figure 17. Guess The year wireframes](image)

*LaunchActivity* — It is just a white screen in which the database is created. That way there is no need to be creating all the time in the other activities.
7.2. Layouts design

7.2.1. QuickGameActivity

This activity will be used to decide which category you will to play in. It will also show your maximum score and progress bar of each category.

![QuickGameActivity Layout](image)

Figure 18. QuickGameActivity Layout

7.2.2. First Time Dialog

The first time a player plays the game, he will come up with this dialog, which will show the player some basics of how to play. I have tried that it is very beautiful for the user to see.
7.2.3. *GameActivity*

This is the main activity of the game. It will be used to play and guess the year of some historical facts.
Figure 20. GameActivity Layout

Aside, you can also see that depending on the category the thematic colour will change.
7.2.4. Feedback Dialog

The feedback dialog is the one that comes out when

a) The timer is over.

b) The user guesses the year.

Then, the feedback dialog will have 2 different parts:

1. Feedback of the result
   a) Perfect!!! You only tried once! 😊
   b) Good one! 😊
   c) Ooooops! Time UP 😞

2. Data of the game
   a) The fact description and the year when it happened. This will be used so that the
users learns about it (the final goal of the APP is that the user).

b) Number of attempts
c) Fact Score
d) Total Score

The user will be able to continue playing when he presses the continue button.

Figure 22. Feedback Dialog

4.2.5. Final Score Activity

In this activity they show you the final score that you are going to get.
Data presented in the layout:

- The score
- The stars
- The level saying how well you are.
- Share button
- Continue button

Score Levels

Figure 23. Score Levels
8. APP IMPLEMENTATION

Having the APP designed, the next step was to implement it. In order to have it as cleaner as possible, I decided to organize the Java files into different packages.

Figure 24. GuessTheYear packets and java files structure

8.1. The Model

The part of the model basically consists of application data.

8.1.1. Constants

These is data used by all the app. It helps make it clearer (to understand the code) and avoid unnecessary mistakes.

There are also some static elements that will be able to be used in the other activities easily.

```java
public static final int WORLD_HISTORY = 1001;

public static final int CHINESE_HISTORY = 1002;

public static final int SPANISH_HISTORY = 1003;
```
8.1.2. Fact

This is the definition of the object “Fact”. This object will be the core object in all the game. It will be used by the database.

The description is not used at the moment, but could be used in further versions.

8.1.3. ScoreMethods

This is used to include all the important things from the current score.

GlobalScore is the accumulated score you have until then.
HighScore is a Boolean that tells you if it is the highest score or not.
Level is an int that tells you which is your level.
CurrentResults is a list that tells you from a game (5 answers) how many:

- You haven't answered. 0
- You have answered right. 1
- You have answered wrong. 2

In this activity there are also some **methods**.

**GetLevel**

This is used to know the level of the user when he ends the game. The percentage follows a Gaussian distribution.

```java
public static int getLevel(int percentage) {
    if(percentage<30){
        level=1;
    }
    if((percentage>=30)&&(percentage<47)){
        level=2;
    }
    else if((percentage>=47)&&(percentage<65)){
        level=3;
    }
    else if((percentage>=65)&&(percentage<80)){
        level=4;
    }
    else if((percentage>=80)&&(percentage<=100)){
        level=5;
    }
    return level;
}
```
GetScore

This method is used to get the score depending on if the answer is correct, and if it is a perfect or not.

```java
public static int getScore(boolean result, int realYear, int num_attempts){
    int score=0;
    if(result==true){
        score=300;
        score= score + getPerfect(realYear, num_attempts);
    }
    return score;
}
```

GetPerfect

The method is used to see if it is a perfect or not. A perfect would be when the user guessed the year at first.

```java
public static int getPerfect(int realYear, int num_attempts){
    int extraPerfect=0;
    if(num_attempts==1){
        if(realYear>1900){
            extraPerfect=50;
        }else{
            extraPerfect=70;
        }
    }else{
        extraPerfect=70;
    }
    return extraPerfect;
}
```
8.1.4. SingleToast

This is used to extend the Toast class. The difference is that in case a new Toast it launched is created, the previous one disappears. This is necessary for the KeyboardFragment (which is used to validate the year).

```java
public class SingleToast {
    private static Toast mToast;
    public static void show(Context context, String text, int duration) {
        if (mToast != null) mToast.cancel();
        mToast = Toast.makeText(context, text, duration);
        mToast.show();
    }
}
```

8.2. The Database

The Database is done with SQLite.

```java
private static final String DATABASE_NAME = "db";
private static final int DATABASE_VERSION = 1;
private static final String sqlCreate = "CREATE TABLE Facts (id INTEGER, drawable TEXT, fact_name TEXT, description TEXT, type INTEGER, year INTEGER)";
```

InsertFact

I have created this method to insert a fact easily, just introducing it in the parameters.

```java
public void insertFact(int id, String fact_name, String description, int drawable, int type, int year) {
```
SQLiteDatabase db = getWritableDatabase();
if(db != null){
    ContentValues values = new ContentValues();
    values.put("id", id);
    values.put("fact_name", fact_name);
    values.put("drawable", drawable);
    values.put("description", description);
    values.put("type", type);
    values.put("year", year);
    db.insert("Facts", null, values);
    db.close();
} }

InsertAllProducts
This method is used to insert all the products together. This will be launched at the beginning not to have to charge the app the whole time.

public void insertAllProducts(){
    insertFact(1, "World War I begins", ",", R.drawable.wh_world_war_i_begin, Constants.WORLD_HISTORY, 1914);
    insertFact(2, "Treaty of Versailles", ",", R.drawable.wh_treaty_of_versailles, Constants.WORLD_HISTORY, 1919);
    insertFact(3, "World War II begins", ",", R.drawable.wh_world_war_ii_begin, Constants.WORLD_HISTORY, 1939);

ReadFactFromType
This method will return 5 different facts. We only want 5 facts because it is the amount needed by the game.
public ArrayList<Fact> readFactFromType(int type) {
    num_facts = 0;
    SQLiteDatabase db = getReadableDatabase();
    String[] obtained_values = {"id", "drawable", "fact_name", "description", "type", "year"};
    Cursor c = db.query(true, "Facts", obtained_values, "type = " + type,
                          "", null, null, "Random()", "5");
    
    if (c != null) {
        c.moveToFirst();
    }
    if (!c.isAfterLast()) {
        factList = new ArrayList<Fact>();
        do {
            Fact fact = new Fact(c.getInt(0), c.getInt(1),
                                 c.getString(2), c.getString(3), c.getInt(4), c.getInt(5));
            factList.add(fact);
            num_facts++;
        } // move the cursor's pointer up one position.
        while ((c.moveToNext()) && (num_facts < 5));
    }
    db.close();
    c.close();
    return factList;
}
8.3. APP Activities

8.3.1. LauncherActivity

This activity is used to create and charge the database.

Constants.createDB(getApplicationContext());

8.3.2. QuickGameActivity

This activity is menu of the app.

See if it is the first time

First of all this is used to see if it is the first time the player plays the game or not. If it is, we
will launch a dialog with the instructions of how to play.

SharedPreferences prefs = PreferenceManager.getDefaultSharedPreferences(this);
if(prefs.getBoolean("First Time", true)){
    SharedPreferences.Editor editor = prefs.edit();
    editor.putBoolean("First Time", false);
    editor.commit();
    final Dialog dialog1 = new Dialog(this);
    dialog1.setContentView(R.layout.dialog_first_time);
    dialog1.setTitle(getResources().getString(R.string.instructions_title));
    Button instructionsButton = (Button) dialog1.findViewById(R.id.instructions_button);
    instructionsButton.setOnClickListener(new OnClickListener() {
        @Override
        public void onClick(View v) {
            // TODO Auto-generated method stub
            dialog1.dismiss();
        }
    });
}
Charge the highest score and the current progressBar

```java
int scoreWorldHistoryValue = prefs.getInt("Score " + String.valueOf(Constants.WORLD_HISTORY), 0);

scoreWorldHistory.setText(String.format("%05d", scoreWorldHistoryValue));

scoreWorldHistoryPB.setProgress(scoreWorldHistoryValue/30);
```

ImageButtons to go to GameActivity

```java
ImageButton worldHistoryButton = (ImageButton) findViewById(R.id.world_history_imgbutton);

worldHistoryButton.setOnClickListener(new View.OnClickListener() {
    @Override
    public void onClick(View v) {
        ArrayList<Fact> myFacts = MDB.readFactFromType(Constants.WORLD_HISTORY);
        Intent intent = new Intent(QuickGameActivity.this, GameActivity.class);
        Constants.setArrayList(myFacts);
        startActivityForResult(intent);
    
    }

});
```

8.3.3. GameActivity

First of all we take the factList from the constants. This factList has been set when we pressed the button in QuickGameActivity.

```java
factList = Constants.getArrayList();
```
if (factList != null) {
    myFact = factList.remove(0);
    Constants.setFact(myFact);
}

Then depending on the type of the fact we set a different color for the bar.
if (myFact.getType() == Constants.CHINESE_HISTORY) {
    box.setBackgroundColor(getResources().getColor(R.color.theme_color_chinese));
}
else if (myFact.getType() == Constants.SPANISH_HISTORY) {
    box.setBackgroundColor(getResources().getColor(R.color.theme_color_spanish));
}
else if (myFact.getType() == Constants.WORLD_HISTORY) {
    box.setBackgroundColor(getResources().getColor(R.color.theme_color_world));
}

Then we set the rest of the items from the fact and the current score.
theYear = myFact.getYear();
theFactName = myFact.getFact_name();
description = myFact.getDescription();
TextView scoreActivityGame = (TextView) findViewById(R.id.score_activity_game);
TextView factNameText = (TextView) findViewById(R.id.fact_name);
ImageView factImage = (ImageView) findViewById(R.id.fact_drawable);
factNameText.setText(theFactName);
factImage.setImageDrawable(getResources().getDrawable(myFact.getDrawable()));
Constants.setArrayList(factList);
scoreActivityGame.setText(String.valueOf(ScoreMethods.getGlobalScore()));
fillCurrentResults();

FillCurrentResults is the method that fills the current results with a tick/cross/nothing, depending on
how the user has done it previously.

```java
ImageView factImage1 = (ImageView) findViewById(R.id.result_1);

if(ScoreMethods.getCurrentResults().size()>=1){
    if(ScoreMethods.getCurrentResults().get(0)==1){
        factImage1.setImageDrawable(getResources().getDrawable(R.drawable.game_elements_tick));
    }
    else if(ScoreMethods.getCurrentResults().get(0)==2){
        factImage1.setImageDrawable(getResources().getDrawable(R.drawable.game_elements_cross));
    }
}
```

### 8.3.4. Final Score Activity

This activity just shows the results and updates the database with the finalScore in case it is better that the previous maximum score.

### 8.4. APP Fragments

The Fragments are a useful key from android. They allow you to separate the code and to be able to change it dynamically very easily. The Fragment used in my APP is called keyboard fragment.

#### 8.4.1. Keyboard Fragment

It is the responsible of having the year introduced and of validating the result.

It first inflates the keyboard layout.

```java
View v = inflater.inflate(R.layout.fragment_keyboard, container, false);
```

When introducing a year, it appends it in a variable called introduced year. In case it’s higher
than 9999, it shows a toast.

Button b0 = (Button) v.findViewById(R.id.button_0);

    b0.setOnClickListener(new Button.OnClickListener() {
        @Override
        public void onClick(View v) {
            if(introducedYear.getText().length()<4){
                introducedYear.append("0"); }
            else{
                SingleToast.show(getActivity(), "The year is not that high", Toast.LENGTH_SHORT);
            }
        }
    });

When pressing the OK button verifies if the year is correct or not. If it is correct, it launches a method called showDialogScore. In case the introduced year is 0, it shows a Toast.

Button bOK = (Button) v.findViewById(R.id.button_ok);

    bOK.setOnClickListener(new View.OnClickListener() {
        @Override
        public void onClick(View v) {
            if(introducedYear.getText().length()==0){
                SingleToast.show(getActivity(), getResources().getString(R.string.year_not_introduced), Toast.LENGTH_SHORT);
            }
            else{
                num_attempts++;
                int userValue = Integer.valueOf(introducedYear.getText().toString());
                if(userValue!= theYear){
                    introducedYear.setText("");
                    showToastFeedback(userValue, theYear);
                }
            }
        }
    });
Appart from verifying if the year is correct, a Thread called CountDownTimer is being runned. In case it is finished without a correct answer, it will launch showDialogFactScore with the result false.

```java
CountDownTimer countDownTimer = new CountDownTimer(length_in_milliseconds, 20
/*period_in_milliseconds*/) {
    boolean finished = false;
    @Override
    public void onTick(long millisUntilFinished) {
        if(stop==false){
            pbTimer.setProgress((int) millisUntilFinished);
            if(millisUntilFinished <= 50){
                finished = true; }
            else{
                finished = false; }
        }
        else{
            millisUntilFinished= length_in_milliseconds;
            this.cancel(); }
    }
    @Override
    public void onFinish() {
        if((stop==false)&&(finished==true)){
            showDialogFactScore(theYear, false); }
    }.start();
    return v;
}
```
The `showDialogScore` method is used to launch the dialog in case the time is over or in case the result has been set correctly. It will also set the `currentResults` and the `currentScore`.

### 8.5. APP Layouts

This part is done to specify how the layouts have been built.

#### 8.5.1. `activity_quick_game.xml`

This activity is used to decide which category you will like to play in.

![Image of activity_quick_game.xml layout](image)

Figure 25. `activity_quick_game.xml` layout

*It is a relative layout and it has for each category:*

- An `ImageButton`
- A `ProgressBar` showing the progress of the game
- A `TextView` showing the current punctuation.
8.5.2. dialog_first_time.xml

The first time a player plays the game, he will come up with this dialog, which will show the player some basics of how to play. I have tried that it is very beautiful for the user to see.

This is a relativeLayout with 3 ImageView, 3 TextView and a Button.

8.5.3. activity_game.xml

This is the main activity of the game. It will be used to play and guess the year of some historical facts.
This is the most important part of the game and it has different elements:

- A bar up of the screen. It contains:
  
  a) The current correct/incorrect answers. It is done with a LinearLayout and 5 ImageViews.
  
  b) The score. It is a TextView.

- An ImageView of the picture.

- A progressBar of the time left.

- The keyboard.

The keyboard is done with a fragment. It is because it helps and in case we wanted to change later to another kind of thing we could implement it very easily.

KeyboardFragment is a keyboard with vertical orientation that has different elements:

- TimeBar

- A linearLayout with horizontal orientation containing:
1) EditText were the text will appear
2) OK Button

-A linearLayout with horizontal orientation containing:
   1) 5 number buttons: 1,2,3,4,5
   2) A DEL button

-A linearLayout with horizontal orientation containing:
   1) 5 number buttons: 6,7,8,9,0
   2) A CL button

8.5.4. dialog_fact_score.xml

The feedback dialog will have 2 different parts:

1. Feedback of the result
   a) Perfect!!! You only tried once! :D
   b) Good one! 😊
   c) Oooops! Time UP :S

2. Data of the game
   a) The fact description and the year when it happened. This will be used so that the users learns about it (the final goal of the APP is that the user).
      b) Number of attempts
      c) Fact Score
      d) Total Score
      e) Perfect?

The user will be able to continue playing when he presses the continue button.

The feedback of the result is the title of the dialog. The data that appears in the second part
is a RelativeLayout. There are 9 TextView, 4 for describing what it is, 4 for the score and 1 for saying if it is perfect or not. Then, in the same layout there is a continue button.

![Mao Zedong's Death](image)

Figure 28. dialog_fact_score.xml layout

8.5.5. *dialog_final_score.xml*

In this activity they show you the final score that you are going to get.

Data presented in the layout:

- The score
- A progress bar.
- The level saying how good you are.
- Share button
- Continue button
It is composed by three different layouts:

a) RelativeLayout. The one that says which score you have and if it is high score or not.
   i) TextView showing it is total score
   ii) TextView showing the total score
   iii) Progress bar
   iv) TextView saying if it is high score

b) RelativeLayout. The one that says what you are depending
   i) TextView you are a...
   ii) TextView showing what you are
   iii) ImageView showing what you are

c) LinearLayout. The one that has share and continue button
9. Testing

To test the behaviour of the APP I have used the website appthwack.com. There are other alternatives, such as testin.cn, but I decided to use this as it was free and in English.

The app will be tested for five different devices of different size and different android version:

- Dell Venue 8
- Asus MeMo Pad FHD 10
- Dell Venue 7
- Lenovo IdeaPhone K900
- Motorola Droid RAZR

9.1. Overview of the report

The APP has successfully passed the test for all devices.
9.2. Performance Test

**Figure 31. Performance Test**

9.3. Performance test per device

**Figure 32. Performance Test per device**
9.4. Running test per different devices

**Figure 33. Running test per Asus MeMo Pad FHD 10**

**Figure 34. Running Test per Dell Venue 7**

**Figure 35. Running Test per Dell Venue 8**

**Figure 36. Running Test per Lenovo IdeaPhone K900**
9.5. Screenshots per different devices

Figure 37. Motorola Droid RAZR i

Figure 38. Asus MeMo Pad FHD 10 Screenshots

Figure 39. Dell Venue 7 screenshots

Figure 40. Dell Venue 8 screenshots
9.6. Conclusion of the testing

The testing has been useful, because thanks to it I have been able to detect a problem I had with the RAM consumed. I discovered it was due to the load of images.

Having this problem resolved, I have used it again and the results have been satisfactory. There were no errors, layouts fitted appropriately to the screens and the behaviour of the app was fast.
10. MARKETING

As there is so many competence in the mobile games market, it is essential to have a good marketing strategy to be able to get users. In this chapter the definition of the game and the logo will be explained. As well as some marketing strategies whose results will be analysed in Chapter 11.

10.1. The Name

Histogame was the chosen name.

I think the name is good because of these two reasons:

i) It shows you what the game is about

ii) It invites you to play.

10.2. Logo

Figure 43. Histogame Logo

i. The shape

First of all, in the android developers website say as a recommendation while designing the
logo that it should have a recognisable shape. In my case it was a circle.

I used 3 circles merged to suggest that you could choose among 3 different categories. Inside and in the middle I put the H to remark that it was a History game.

iii. The colours

I used the five colours of the game.

+ White for the background
+ Black for the font.
+ Three representative of the category
  - Blue for World history
  - Yellow for Spanish History
  - Red for Chinese History

iv. The H

I used the H as a reminder of History. This letter is used in lots of places such as the history channel. Aside, I used the font Times, as it is a historical font.

10.3. Google Play description

For obtaining downloads it is very important to have an outstanding google play description and screenshots.

Here is the result.
Additionally, I made a poster to spread the game in the street.
10.5. Google groups and LinkedIn groups

Finally, I have also used Google groups and LinkedIn groups to promote my app between developers and get some feedback.
11. **Analysis of the Results**

11.1. Statistics

After doing 2 weeks of marketing, these are the results I have achieved. I have used Google analytics to know all the figures.

**Number of Downloads**

![Figure 47. Number of downloads and Sessions](image)

The number of downloads of the app has been 82. The links have mostly come from searches in Google Play. The second way of being downloaded has been through a link posted in LinkedIn and Google+.

These users have done an amount of 237, which means every user has done a media of 2.89 sessions. Taking into consideration that most players have had the app for less than one week, it is a nice figure.

**Country of new users**

We have seen that the country where the app has been most downloaded has been Spain. It is because the community I belong to is mostly Spanish. The second one is United States. Downloads there have come from the diffusion made in Google+. Finally, China, country in which I am living, where downloads have come by direct communication.
Android OS Version

We can see that the version used is mostly the fourth. With only a 7.2%, 2.3.4. That means that we should focus on the last android versions (without forgetting that there are still some from older versions).

Network Operators Statistics
11.2. Analysis of the results

We can see that although the rating of the app is very high, the number of downloads are not as good. This is because the product is very good, but the marketing could be better.

The actions that could be taken in a future could be:
- Improve the virality inside the game. That would be enabling the user to share with Facebook, and even giving them some reward if they do it.

- Have relevance in the Social Networks. That would mean to make a Facebook, Twitter, Instagram site. There some actions such as doing some contest, giving some things related to the game could be done.
12. CONCLUSION

This project has been able to achieve all the objectives proposed at the beginning.

In order to be introduced to games and how a game was done, I found interesting to first understand the concept of games and the kinds of games. Later, so that I was able to design the videogame. I investigated about fun, specially, the elements of a videogame and the necessary documents while creating a game.

Additionally, an important part of the project was to analyze the Market of mobile games, and how it was changing game industry. Thanks to this analysis, it was possible to see how China is a world power, with one of their enterprises, Tencent, in the highest place of the ranking in revenue at Mobile Games market. To conclude, the mobile games player profile and efficient marketing strategies were analyzed.

Having these done, the next stage, and the core of the project, was to develop the APP using the tools given by Android. This objective was successfully achieved, as it was created an alpha version of the app, with a good performance and an intuitive design. The APP surpassed the testing both at performance and a fragmentation level. Thanks to the testing tool, it was seen that it worked perfectly for most android versions and all device sizes. Apart from that, it had a good rating in Google Play, what meant that the players liked the game. As a point to be improved, marketing, as although having a good product, it wasn’t possible to transform it into a big number of downloads.

Personally, another of the objectives was fulfilled. Firstly, android programming was learned, and consequently JAVA and XML. Secondly, knowledge about the design of videogames and wireframes was acquired. Adobe Illustrator, Adobe Photoshop, FluidUI and appthwack were other tools that I learned to use. Finally, I was introduced into marketing concepts, that helped me set the name, design of the logo and a establish communication strategy to
spread the videogame.

To conclude, by the experience from my project, I could say there is a lot competence in mobile games market. Therefore, in order to achieve success, there are other important things apart from having a great product, such as marketing, virality, an attractive design and a good business model. But in case you achieve it, there is a great market with lots of opportunities to achieve the much-desired success.
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