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VRetorik: A VIRTUAL REALITY VIDEO GAME TO IMPROVE PUBLIC SPEAKING SKILLS

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Abstract: A Google search for "fear of public speaking" is enough to get more than eight million results. This is no coincidence since 75% of the population (glossophobia, 2011) suffers from this phobia. This is why there are numerous studies carried out over the last few years (Anke W.Blöte, 2009). In addition to these, some tools seek to help improve the ability to speak in public. This is the case of Orai (Orai, 2018) or Chiara (Chiara, n.d.), who can create personalized training after recording and analyzing a speech. Not everything is focused on technology and training, you can also find board games, as is the case of Retorik (Juanjo Mestre y Marta Segarra, n.d.). Retorik is a card game in which players must improvise a speech, improving their communication skills by playing. Both games and technology can help improve public speaking skills. In this project, both worlds have been combined to create a virtual reality video game capable of analyzing the speaker and giving him/her feedback to improve his/her communication skills. This paper details the design and creation of VRetorik, an educational virtual reality video game aimed at improving these skills. It relies on improvisation and creativity to gamify the player's experience. Using artificial intelligence systems, the content of the speech, and the emotions transmitted by a speaker is analyzed to provide feedback. In this way, it is intended that the speaker improves the ability to speak in public by playing.

Keywords: public speaking, educational video game, virtual reality, speech, gamification.

1. Introduction

Throughout the human academic period, there are hardly any mechanisms to improve public speaking skills (Ott, 1998), which is why fears and phobias arise when facing an audience to give a speech.

To address these fears, some therapies provide a coach to improve public speaking skills, who offers a personalized plan to reduce the fear of public speaking (Parker, 2003).

Thanks to technological advances, tools have been developed in which virtual reality plays an important role. These tools are designed to improve public speaking skills (Cristina Botella, Javier Fernández-Álvarez, Verónica Guillén, 2017). Virtual Reality allows us to generate a safe virtual environment, as realistic as possible to the situation to be represented. An example is BeFearless (Samsung, 2016), a tool developed by Samsung.

However, many of these tools simply generate a virtual environment in which to train but do not provide real-time feedback on how the user is doing it and do not work on a key aspect such as improvisation.

On the other hand, several studies [ref] show how important and effective video games are when it comes to improving skills in fields such as mathematics (Devlin, 2011) and programming such as CodinGame (codingame, 2016), among others. Besides, virtual reality is starting to be used in language learning (Klaus Schwienhorst, 2002).

Apart from technological tools and training methods, there are board games focused on improving communication skills. A relevant case is Retorik, a card game with which through creativity,

improvisation, and entertainment, its players can gain confidence and skills to lose their fear of public speaking.

In this paper, we present the design and implementation of VRetorik, an educational video game (based on Retorik) that focuses on improving public speaking skills through improvisation.

The document is structured in such a way that it first reflects the objectives of the project. Then, it focuses on how the transformation from the board game Retorik to the video game VRetorik has been carried out in virtual reality (see Figure 1). Next, the dynamics of gamification that have been followed will be discussed and finally, the conclusions and future work of the project will be detailed.

2. Target

The main objective of this project is to develop an educational video game in virtual reality, which is capable of providing real-time feedback to the player's presentation. In this way, we seek to improve their public speaking skills through improvisation.

At the same time, the aim is to create a virtual space where the user feels comfortable and where he can rehearse a speech as many times as he needs to in a realistic environment. You will also be able to familiarize yourself with the feelings of discomfort or oppression generated by this type of phobia and master them little by little.

To do this possible, a gaming environment will be developed that is motivating for the player. This has to be a safe environment in which the player is not afraid to make mistakes. Finally, it is important, as in any video game, to balance the level of difficulty so that it is challenging but not frustrating for the player.

Finally, useful feedback must be offered to the user based on the content of the speech and the emotions it conveys. The player must know their successes and errors to improve.

3. Game design

This section first explains the dynamics of the board game on which VRetorik is based. Next, the process of adaptation and improvement of the original board game is detailed, and finally, the gamification process is used.

3.1. Retorik: the board game

Retorik is an educational and creative project, funded by crowdfunding. It aims to improve communication skills when speaking in public. It focuses primarily on improving the player's ability to improvise, a key aspect of public speaking.

The game begins by selecting a card at random from the theme deck and five others that include random phrases. The player has to talk about the topic that has come up by introducing the 5 random phrases into their speech for 1 minute. At the end of the time, the rest of the players must evaluate the speech, determining whether the topic has been satisfactorily addressed and whether they have introduced the phrases. If so, the player keeps the theme card and the one who has more theme cards at the end of the game wins (see Figure 1).

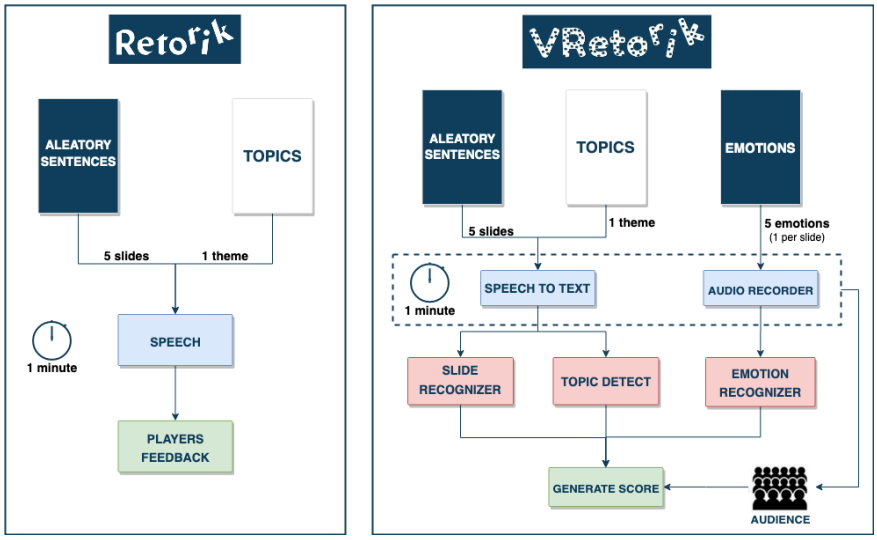

Fig 1. Retorik and VRetorik game flow

3.2. From Retorik to VRetorik

VRetorik is divided into two environments (see Fig. 2). On the one hand, the virtual environment (VE), where the player must present his speech in front of an audience following the rules of the game Retorik. On the other hand, there is the analysis environment (EA), where all the data collected from the speech is processed in real-time, and feedback is generated to the player about his speech.

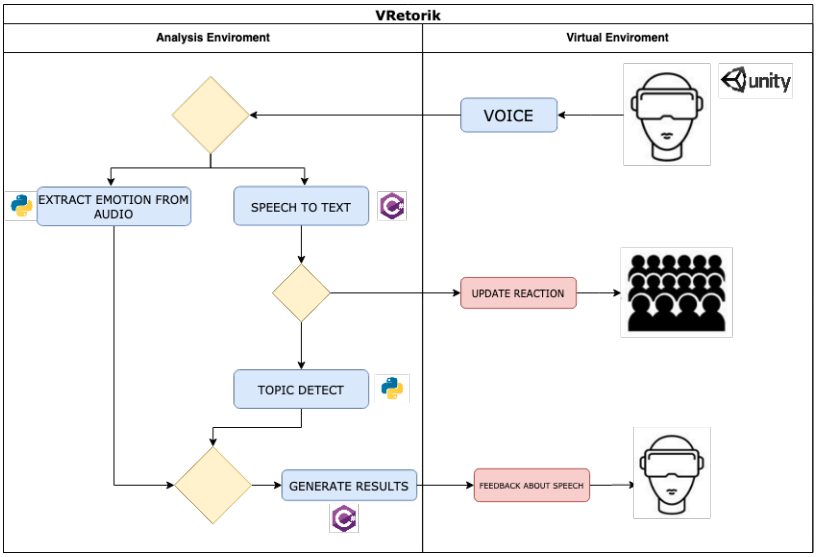

Fig 2. General functioning of the two environments

3.2.1 Aleatory sentences

It is established that a key aspect of public speaking is the ability to improvise. That's why the dynamics of the game is focused on getting random phrases into the speech most creatively and coherently.

To simulate the selection of five cards as in the original game, five random phrases will be generated at the beginning of the game from a pre-established list. A real-time voice transcript is then made so that when the player says the sentence, the system recognizes it and removes it from the environment (see Fig. 3). The randomly generated sentences must be the same as those recited by the player, just as in the original game. Also, the speech transcript is stored for later analysis and processing.

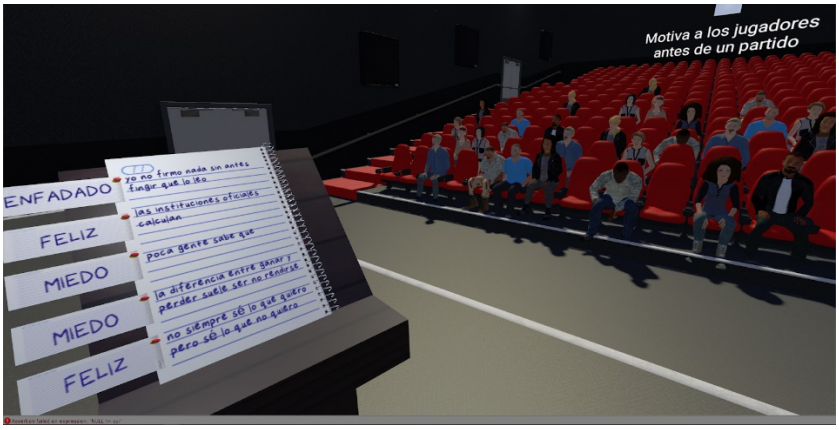

Fig 3. Game image during the game

3.2.2 Topic

VRetorik implements a mechanism for identifying topics from the audio transcript. To do so, at the beginning of each game, a random theme is generated on which the player must deal with the speech that is going to be articulated. That topic is offered to the player and he must speak about it for one minute.

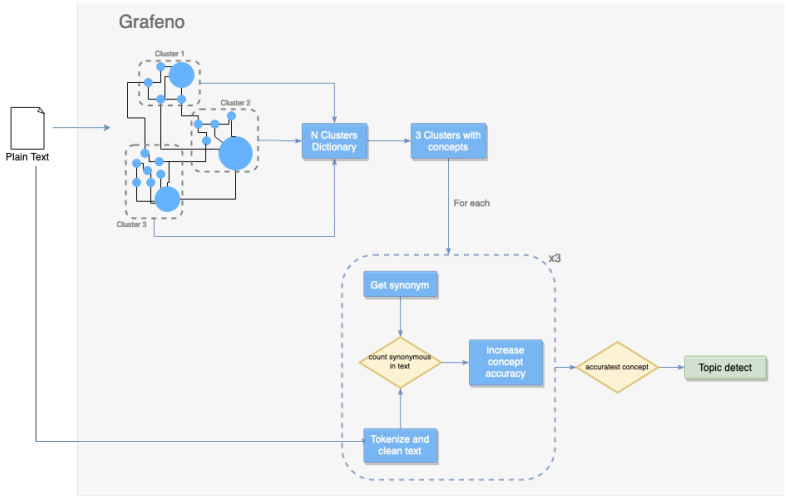

Fig 4. Game image during the game

Along the process of identifying the theme, our algorithm is supported by the Grafeno tool. This tool allows us to create a concept network from a plain text, with a series of transformers and operations, clusters of concepts are generated from the original text. The clusters that have a higher degree of connection are selected, this value is set to discard less connected clusters, and those with a higher degree are stored next to the concept to which they refer.

Once, an algorithm has been implemented from the highest degree clusters generated in the concept network, the three concepts of the highest degree clusters are extracted. With the use of natural language processors (NLP) such as Wordnet and NLTK, a process of searching for synonyms of the concept in the original tokenized text is achieved to identify the topic. For each occurrence of the concept synonym in the tokenized text, more weight is given to the topic being processed. In the end, the topic that has obtained the most weight after this screening is selected and identified as the topic of the speech. Finally, this topic is compared with the one originally requested by the user to decide if the player has adjusted to the requested topic.

3.2.3 Sentiment analysis

Although the original game does not ask for anything in terms of emotions in the player's speech, it has been decided to use the technological advantages to improve the gameplay. To do this, during the game, the player is asked to recite each of the phrases with the feeling associated with it generated randomly.

Once the game has started, the system uses a voice feeling detection algorithm. The use of an algorithm that detects feelings from the audio is much more accurate than the algorithms that detect them in the text, such as TextBlob. For this analysis, the system detects the moment in which the phrase is recited and stores the audio fragment for analysis. This step is repeated for each of the five phrases that the player must recite. Finally, five feelings associated with each phase of the game are identified: happy, neutral, sad, angry, and fear.

For the analysis of feelings by voice, Vokaturi has been used, which, based on the audio recorded during the game, detects the feeling expressed in the game. According to the tests carried out from audios recorded by actors and actresses, Vokaturi gives us 66.5% accuracy in detecting feelings.

3.2.4 Public

Finally, and to make the game more dynamic, a virtual audience has been designed to react to the evolution of the paper (see Fig. 5). Depending on the development of the presentation, the listeners interact with the speaker. These actions are managed through the data obtained in real-time from the game and each character in the audience reacts differently thanks to the design of a state diagram.

Fig 5. Public clapping and shouting during the talk

3.3. VRetorik Gamification Dynamics

3.3.1 Score

At VRetorik, a scoring mechanism based on three factors has been implemented:

Random phrases: for each phrase that the player enters in his speech, he will be given a score of 5 points for each one, up to a maximum of 25 points.

Feelings: if the player can reproduce the feeling requested in each phrase, the score will be increased by 5 points, up to a maximum of 25 points

Theme: After the speech, if the theme identified in the speech by the implemented tool coincides with the theme proposed at the beginning of the game, a score of 50 points will be awarded.

With the three factors mentioned above, the player obtains a maximum score of 100 points. Once the count of random phrases introduced in the speech and feelings expressed in them is finished, they are processed to analyse how many of them have been successfully overcome.

The scoring algorithm is based on the following formula:

((5 * Nº right sentences) + (5 * Nº right sentiments)) + 50 * [0 | 1 if topic is wrong | correct]

4. Conclusions and future work

An educational video game has been developed, which through improvisation and creativity improves public speaking skills. To this end, the dynamics of Retorik have been maintained in a gamified virtual reality environment. The video game is capable of randomly generating the phrases that the player must include in his speech, making a voice transcription of the player's speech to subsequently identify the topic of the speech, and, finally, from the recorded audio of the speech, perform a sentimental analysis.

The sentimental analysis makes the improvisation much stronger in the user because he will have to make an effort to capture the feeling given at the beginning of the game.

For the identification of the topic, a method of regressive derivation was realized from the topics obtained by Grafeno. This process consists of locating the root of the word by eliminating its affixes. Following this identification system, the expected accuracy was not achieved. That is why a synonym search algorithm was chosen from the extracted themes. After this process, their appearances in the original text are counted to add more relevance to the concept from which these synonyms are derived.

As future work, it is proposed to implement a more complex punctuation algorithm. We also want to develop an algorithm that adapts the feeling that the player must interpret each random phrase according to its morphology. We are currently working to improve the video game and provide it with greater syntactic flexibility.

Due to the state of the Covid-19 pandemic, the desired experiments could not be carried out with users in schools. Experiments are planned to test the effectiveness of the video game and its scope.

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