

# Evolving Enemy Avatar through Categorization Technique in Computer Game for Healing

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**Abstract**—This paper describes the creation of unique negative avatar/character from the children imaginations. These avatar/characters will eventually be used in computer games for healing purpose. For gathering children ideas about evil character, we used sketch/drawing strategy to collect data effectively. A survey was conducted from 100 children of age group 6-16, from different schools of Pakistan. In the survey children were asked to draw their imaginative enemies on a paper. Collected drawings were then categorized and grouped on the basis of similarities of concepts of enemy features and structures by observing each drawing. We are in the process of designing an algorithm that will extract features from all sketches and generate feature books for each corresponding feature. In the next step another algorithm will be designed to create unique character from multiple feature books by using random selection. This process will create unique avatar/character for the healing game environment as well as ensure children participation in its creation.

**Index Terms**—Avatar, sketches, healing, feature book

## I. INTRODUCTION

Computer Games have been becoming more influential and providing excitement and approaching out more graphical reality and richness [8]. “Serious health games” is a jargon, which is used for virtual games. Their goals go further than the enjoyment [9]. T. Baranowski [10] describes in his paper, that games may be directed to diseases prevention or management, acquisition of healthy habits, among others things. Video games have strong impact on children minds and leave positive and negative effect on them according to the game. There are many positive effects of video games on some people as suggested by some researches; people play because they want to get away from their everyday life, break routine, to relieve stress, allow them to cool off when they are stressful, take out their anger through the game rather in real life because they are fun and an interesting way to spend time.

From researches it has been observed that destroying or killing the negative character in the video games by the player character of video games helps them to built positive energy. Also children got the great feeling of achievement that they have done something good to destroy the evil. Children involve their selves as much as in video game that they start considering themselves as a character of game. Children find video games more interesting and they feel more enthusiasm while playing if they find games of their

interest and according to their choice. Games can play an important role in healing the physical or psychological illness. Our aim is to create unique evil characters which can be use in the game, which is designed on the concept of guided imagery therapy for faster healing of the brain tumor in the children. Brain tumor will be assumed to be an enemy or evil character; to which child has to fight, so in this paper we focus on extracting fear of children’s mind in the form of enemy.

The main requirement of this paper is to evolve a unique negative. For this purpose we conducted a survey. Purpose of the survey was to design an imaginary character according to the perception and interest of the children, taking samples of 100 students of different schools of Islamabad, Pakistan with age range 6 to 16 years; children were asked to draw the sketches of evil/negative character which comes to their mind. This survey provided us with first hand data which helped us to analyze the picture of game characters present in the minds of children. These characters can be further used in brain tumor healing game. For evolving unique character from many drawings, an algorithm is designed which extracts features from all sketches and generate feature books for each corresponding feature in characters. For example considering head a feature, from sample of 100 drawings, heads from each drawing is extracted and stored in the feature book for heads. Similarly for each major part of the body there will be a corresponding feature book. To create unique evil avatar/character, random selection of feature will be made from each feature book.

Literature review reveals that there has been done significant work on the health game but work on extracting ideas from the children imagination is done in small quantity.

Recent years, the rapid development of interactive digital media, especially animated caricature and computer game, has brought up a booming industry concerning economy, culture and education domain in the world. There are a lot of games for children for entertainment and fun but now trend is changing and health related games are also being encouraged [3].

Ben Sawyer [8] describes about the serious games. He stated that, in the less than hundred years, serious games and games studies are raising. One of the most important sectors seeing the impact of games is health. The Serious Games Initiated with the support from the Lounsberry Foundation and the Woodrow Wilson International Center for Scholars, in 2004. In this paper our focus is on collecting children imagination and using it in the game. Previous work regarding our approach is rarely done. There has been significant research on character modeling but only a few researchers have paid attention to use children own imaginations before modelling a character. Characters in

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games are essential for players to have amazing, unforgettable experiences [5]. Children’s freshness and imagination helps to discover new creative ideas and their ideas can be benefited in terms of developing collaboration skills and critical thinking capabilities. According to Christiane Moser et al. after performing a case study with children aged between 10 and 11 years Garzotto concluded that children cannot only act as users, testers, informants or design partners in the development process but can also take over a key role as experience design innovators [1]. Joana Dimas et al. revealed in his research that emotions play an important role in social interactions and as such, they are critical in creating engaging and believable characters that users can interact with. For the past few years, many techniques have been developed to create engaging characters that, through the use of emotions, achieve more behavior realism and enhance interactions with users [2].

E.H. Vick believed that believable characters are a game element that reinforces player engagement [7]. In different researches it is discovered that user’s emotion can be presented by player avatar with animated image. Furthermore, user’s emotion will influence the affective states and behavior style of non-player characters (NPCs) around in the game environment [6], and game course may be tuned with user’s affective response. Changneng Zhou et al. attempted to build personalization into Game-Based Learning (GBL) system that will contribute to user’s mastery of knowledge & skill, and help user to regulate and improve his personality traits [3]. Jiaming You and Michael Katchabaw in their paper introduces a novel approach to integrating various psychosocial models to facilitate the construction of flexible, expressive, and believable non player characters for modern video games [4]. From previous work it is noticed that no such software been developed which extract features from multiple sketches/drawings and generate feature books for each corresponding feature and from feature books evolves a unique character.

## II. METHOD

### A. Process to Collect Data

To create unique negative character from the children’s imagination, children were needed to get involved. For this purpose we did survey and children were asked to put their imaginary evil or negative characters on paper in the form of sketches/drawings. Since sketches have been used so far to visualize the imagination and fantasy of mind as children always have strong imagination and fantasies hence sketches were the powerful tool to collect data.

### B. Data Collection

Different schools of Pakistan were visited in order to conduct this survey and children of age group 6- 16 were targeted. The children were asked to sketch their imaginary negative character which they feel they get scared from. In this regard hundred such sketches/drawings were collected. The next step was to analyze the sketches, categorizing them in a proper group and create the enemy/evil character.

### C. Sketch/Drawing Categories

By careful analysis it was observed that these samples of

drawings can be divided into three categories i-e Drawings containing spikes and horns, Drawings with multiple limbs and faces and Drawings having wizards and witches.

### D. Category 1

Drawings containing spikes and horns

Children have got unique sense of imagination. In the collected sketch data, it was noticed that many of character from sketches deviates from normal human characteristics i.e. spikes, single eye, tail, horns etc as shown in Fig 1.0



Fig. 1.0: Sample of category 1 drawings.

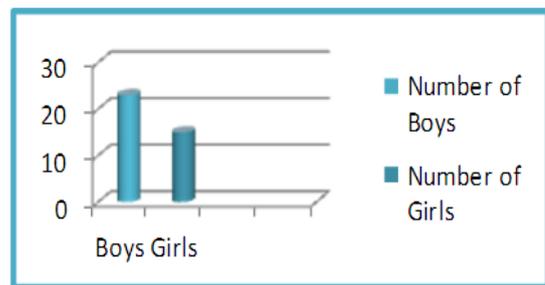


Fig. 1.1. Graphical representation of category 1, drawn by boys and girls.

Fig 1.1 shows the graphical representation of the participants involved in sketching under category 1. Among these participants high percentage was of boy’s i-e 23 out of 38 children.

### E. Category 2:

Drawings containing wizards and witchcraft features:

From the collected sketch data, it was observed that many of sketches consist of wizard or witch character. Children especially girls found wizards or witches scarier hence among the participants involved under this category, girls were of high percentage as shown in Fig 2.0.



Fig 2.0. Sample of category 2 drawings.

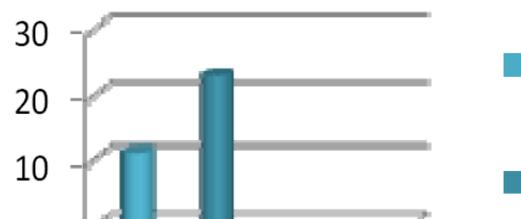


Fig 2.1. Graphical representation of category 2, drawn by boys and girls.

Percentages of girls and boys children participants involved in category 2 are represented graphically in Fig 2.1.

Category 3:

Drawings containing multiple limbs or head features:

The sketches that were categorized under 3rd category comprised of some feature out of the real world i-e multiple limbs and heads. Some of drawings that comes under this category are shown in following figure (fig 3.0)



Fig 3.0. Sample of category 3 drawings.

It was experiential that the imaginary characters by boy participants were more weird and unrealistic as represented graphically in Fig 3.1.

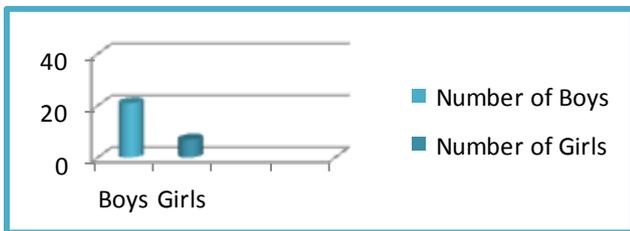


Fig 3.1. Graphical representation of category 3, drawn by boys and girls.

A survey was conducted in different schools of Pakistan. Children drew sketches of characters which they think of, as their enemies. All the data collected from this survey is then digitized. An algorithm is designed in which distinguishing features from each character is extracted and stores in corresponding feature book, then generate a random unique character comprising of random features from children’s imaginary characters.

This approach of taking data directly from children is used because the unique negative character required for health related game was supposed to be somewhat similar to the children’s ideal or imaginary character. Despite this, we believe if children found environment of their interest in the game they would get more involved and found it more attractive.

III. ALGORITHM ARCHITECTURE

Steps: Creating unique character:

- 1) Acquisition and digitization of image
- 2) Apply image restoration technique to reduce noise, correcting geometry distortion and non linearity

- 3) Image compression

- 4) Feature detection by "object detection method" and then save features corresponding to its feature book
- 5) Creating unique character in GUI (Graphical User Interface) panel or character drawing panel

Above points describe simple algorithm for our software which might be slightly alter during implementation. Briefly this software consists of three parts as shown in Fig 4.0.

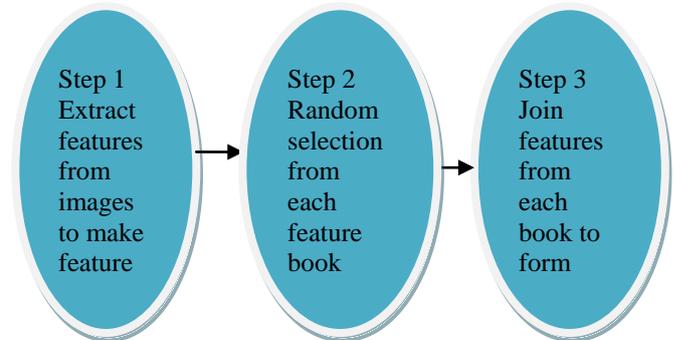


Fig 4.0. Showing parts of unique avatar creation algorithm

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