Dynamic Game Difficulty Balancing in Active Ageing Systems

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Dynamic game difficulty balancing (DGDB) is a research topic that refers to automatically changing game settings, scenarios and parameters based on the players' ability and gameplay. The purpose of DGDB is to keep users engaged and challenged by the game, and to avoid them becoming bored (which usually happens when the game is too easy and not sufficiently challenging) or frustrated (when the game is too difficult and they lose too often). Gustavo Andrade et al. [?] emphasize that this is an essential and important factor in increasing user satisfaction in games, which is greatly desired in educational, therapeutic, medical or other serious games.

There are several researches that propose different approaches for DGDB of video games, based on genetic algorithms, behaviour rules, reinforcement learning or environment variables manipulation, by adjusting elements like non-player characters, number of enemies, resources or task specific time limits [?]. However, active ageing games differ in composition and aim from traditional video games, thus game balancing requires a different approach for them [?].

In this paper we propose a new emotional-motivational game balancing model tailored for active ageing game based systems, by addressing two main differentiating aspects:

- Educational-cognitive characteristic: active ageing games follow different patterns and have different composition elements than traditional video games.

- Specific targeted user age group: older people are subject to anatomical, cognitive and functional changes related to ageing, that influence game play and interaction, such as vision, audio or sensorial sensitivity decline [?].

We analyse this model through a case study on games targeting executive functions for promoting active ageing, identifying the key elements involved in difficulty balancing and how they should be adjusted dynamically based on emotional indirect input from the users and their sensory acuity.

References

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