

AdaptControl: an adaptive mobile touch control for games

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1. Introduction

The key aspect that defines the experience when playing a video game is the effectiveness and intuitiveness of gameplay, allowing an unexperienced player to quickly learn the main aspects of an interactive game and start playing immediately. While older games were usually simple and could be operated with 1 or 2 buttons with a quick learning curve, modern games allow a wide variety of actions that demands a more complex control scheme, sometimes with 10 or 15 buttons, resulting in unintuitive controls. Other methods of interaction, like touch, motion controls and voice, presented a more intuitive way to play games, but never reached the same level of precision found in regular controllers. To create an easier way to interact with games but at the same time, maintain the precision and quick response, delivering the best from both worlds, this work proposes the AdaptControl: a virtual controller based on an Android touchscreen device that communicates to a PC and works as a regular joystick to control a game, that can display only the amount of buttons needed for a game in a simplified interface. But this flexibility creates another challenge: the lack of physical feedback to the user. To solve this issue, the AdaptControl uses machine learning algorithms to detect when the user is missing buttons and correct its position and size to an optimal configuration. And this kind of intelligence applied to the controller will bring another benefit: despite starting with a generic configuration for one game, the controller will be capable of changing its own layout to match each users' ergonomic need, resulting in a personal controller that matches the player's needs.

2. Proposed Adaptive Interface

The AdaptControl is composed of both physical hardware and software components: an Android app with the virtual controller and a software on the PC that will execute the game. The controller will collect all input data from the user and analyze it with machine learning algorithms. This step will determine the correct position for each button in the screen, moving or resizing them to minimize the amount of errors for the user. As an example, if the player is trying to press a button and misses it, touching at its right instead of hitting it, the algorithm will determine that it should be more to the right and will move it. The AdaptControl mobile component is developed for the Android mobile operating system, stores all user input in a SQLite database and feeds this data to a K-Means learning algorithm,

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Figure 1. The figure shows a user playing with the AdaptControl and the adaptation process, with the touches represented as red dots and the correct position for the button as blue dots.

using the powerful Weka machine learning libraries. The PC component will receive the commands from the mobile app and translate them to correspondent keys for the local computer, interacting with the game. The communication is performed using the Bluetooth technology.

3. Results

The new controller concept was tested with 16 users, that used both the AdaptControl and a regular virtual controller without the adaptive system in two different games: Super Mario Bros and Streets of Rage. The AdaptControl improved the precision in 6.675% for Super Mario Bros and in 13.7% in Streets of Rage and presented a considerable improvement to the players' performance in the total score achieved per life in each game. After the tests, the users answered a questionnaire about the usability of the controller and the AdaptControl achieved a widespread positive reaction, with 88% of the users preferring to play Streets of Rage with it and 94% preferring to play Mario with it instead of the regular controller.

4. Conclusions

With the AdaptControl, we hope to bring back the intuitiveness to game controllers, keeping the level of deepness and richness of content in the modern games. The evaluations allowed us to conclude that the adaptive controller brings benefits to a great part of the users and that most players would return to it, as it improves the most important aspect of a game: the capacity of providing an enjoyable experience, regardless of their experience with games.

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