A USER-INTERFACE ENVIRONMENT SOLUTION AS AN EDUCATIONAL TOOL FOR AN ONLINE CHESS SERVER ON THE WEB

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Abstract: This article describes an interaction and interface environment for a public online chess server, on the web, as an educational tool. The main purpose of the environment is to improve chess teaching in Brazilian public schools. The vast majority of such chess online servers considerer and take for granted that users are specialists rather than learners. The solution describes in this article is inserted in an education environment, aiming at providing users with direct access to the contextually significant actions by means of strategic and operational help.

1 INTRODUCTION

In the present article we describe the development of an interaction and interface environment for XadrezLivre (http://xadrezlivre.c3sl.ufpr.br) – a public, online chess server based upon Free Software, whose main aim is to work as a chess education tool. The vast majority of such chess online servers is oriented towards the commercial market, and takes for granted that users are specialists rather than learners, which in turn makes the access to these servers quite difficult for learners.

The game itself is not the sole purpose of the above-mentioned chess server. Indeed, its main purpose is to improve chess teaching in Brazilian public schools (comprising elementary school till high school), particularly aiming at reducing and optimising the teaching time. The main purpose of our work is to call attention to the different users profiles that must be taken into account when designing the server, the differences between learners and specialists, the concern towards the needs of these learners so that they are properly oriented rather than being directly exposed to the specialists community. We intend, therefore, to develop a community that comprises different user's profiles ((Direne et al., 2004); (Feitosa and Direne, 2006)).

Even though there is an interface solution for this chess server through the web, it does not fulfil the current teaching and/or learning requirements that the Brazilian Education Department established concerning chess as an extracurricular activity. Moreover, the interaction takes place almost entirely in a console window by means of command line, which, in this case, requires great cognitive effort from learner-users (which actually is the target profile of the project) excluding them from the chess community, contributing thus to an unnecessary sophistication of the environment. The interface and interaction environment we describe here is innovative within the context of the available chess servers, both fulfilling the demands and suiting the purposes of the chess server upon which it is based.

Our main thesis is that it is possible to correct the flaws of the access tools available today, and therefore help learner-users to overcome the difficulties imposed by the unnecessary sophistication of the chess community. In order to come up with a solution, we went through the literature of a number of areas. In addition to Human-Computer Interaction (HCI) e some of its supporting theories – particularly Semiotics Engineering (de Souza, 2004) –, we also looked into the state of the art discussion on Educational Informatics (EI) and, consequently, into the relevance of computer-supported educational games. Furthermore, since the chess server in question is an online server for web games, our research was extended to educational games through the web, particularly in multi-user environments.

2 LITERATURE

2.1 Educational Informatics

Nowadays, a number of software can be considered educational software. According to (Vicari and Giraffa, 1996), an educational software must meet the needs of its users and possess pedagogic purposes. They also add that every software may be considered educational as long as its use is inserted in a context and situation of teaching-learning in which a specific methodology guides the work.

A branch of Educational Informatics that can be largely explored is the use of software of educational games. The game definition is polemic. One definition say that, game is a free activity in which one proceeds within its own proper boundaries of time and space according to fixed rules and in an orderly manner. It is not everyday life, it is outside the process of directly satisfying needs and desires (Huizinga, 1971).

For (Vicari and Giraffa, 1996), the main purpose of an educational game is to make knowledge absorption and the work with learners significantly easier, helping to explore their cognitive skills. Spontaneity must never be sacrificed in the name of knowledge acquisition because the greatest benefit of a game is to allow learners to express their own decisions (Frbel, quoted by (Kishimoto, 1992)).

The use of computer-supported games for educational purposes leads to an increase in student motivation, and teaches students to persist when faced with challenges and new tasks (Tarouco et al., 2004).

Experts in the area of computer educational games assert that there is a tendency towards the use of strategic educational games since they help students develop intellectually. This kind of game offers simulations in which users apply knowledge they acquired in class in order to improve their performance in the competitive environment. Chess, for instance, has been used for educational purposes for many years.

2.1.1 Educational Games through the Web and Multi-user Environments

Educational games through the web are tools that add to the teaching-learning process and provide students with data gathering and processing, asynchronous learning, real-time interaction among geographically dispersed people, as well as a dynamic scenario (Tarouco et al., 2004). Such interactive environment is called multi-user environment. A number of computer educational games have been expanded through the web, following Internet advances, leading thus to the development of multi-user educational games; in other words, users geographically apart or not are able to interact through computational networks.

In a multi-user environment, users must interact both amongst themselves and with the system (Grudin, 1994). Educational Informatics and the area of HCI have both been joining efforts in order to build adequate environments that embody the above-mentioned features.

2.2 Chess and Educational Informatics

Teaching strategies are rather close to chess strategies, in which dialectics and self-criticism play a central role, and in which the loser profits more than the winner. From a moral point of view, chess establishes an ethical conduct through the losing and winning experiences, which in turn can be used by the teacher when analysing matches and commenting on the students mistakes (Sá, 1988).

Traditionally, the teaching of chess takes place through books that contain a series of schemes and specific methods associated to a set of chess positions. Generalising such methods may be quite a difficult task to students since they may not be able to find possible applications to the content they learnt.

With the help of computer science the teaching of chess may potentially be enriched since the former comprises educational features, collective use, application of heuristic uses and knowledge, among other things. However, nowadays there are only a few groups who dedicate themselves to exploring and applying computational tools and theories in order to better the process of chess teaching-learning.

2.2.1 Interface and Interactive Environments of Chess Servers on the Web

Nowadays there are a number of chess servers available on the web, among which the entire environment of the vast majority – including the interface and interactive environment – does not possess an educational approach, focusing on other issues such as commercial interest (even charging users fees to use the server), for instance. Such servers may be considered mere substitutes of the ordinary chess board and human opponent.

The servers that do possess an educational approach are available as prototypes and do not have an interface environment through the web that meets the educational needs. Despite the attempt to stimulate the learners development through the game, such servers do not dispose of an environment that embodies educational approaches so as to benefit the

most frequent users profile, namely learner. These environments were gradually developed incrementally by the chess community, whose sole concern was to allow for chess playing without thinking of making things easier on beginners. When accessing the system, these beginners face a structure and a technical, sophisticated language which at first excludes them from the community, as well as from chess learning.

3 METHODOLOGY

The XadrezLivre chess server upon which we based our research has been in operation for over 5 years. Its interaction through command language is based upon the international standard Free Internet Chess Server (FICS), which in turn is a protocol used for chess servers in order to offer, through the Internet, the minimum required features in order for games among various users to take place.

The interface solution described in the present article offers a graphic environment that does not require the use of commands via console. However, aiming at giving the graphical interface the full expressive potential of the FICS language and, simultaneously, fulfilling the standards found in this sort of tool and considered references by the community concerned, we elaborated a specific methodology which we shall describe next.

The methodology we used for defining the user-interface environment consisted of two elements, namely (i) studying the formal language of chess specification and (ii) empirically analysing the chess server environments available. These steps were carried out in parallel and separately by different members of the projects HCI sub-teams, who in turn cooperatively described the functionality specification for the new version of the server. Once this initial stage was concluded, we arranged meetings with users to clear their doubts and hear their feedback, aiming at performing necessary adjustments so as to fully support the teaching of chess in schools.

3.1 Formal Fics Language

We already have a widespread formal language for playing chess through the Internet. It is a command language, and such commands were studied so as to identify their individual potential, and thus the existing possibilities, be it for the game itself or for communication among users, which is extremely important for the access of new users – chess learners.

In addition to that, aiming at identifying hierarchies and semantic associations, we classified the

commands and put a conceptual model together. The outcome of such exhaustive work was, on the one hand, the context information, required for making server use by beginners easier and, on the other hand, the specification of the interface structure capable of granting direct access to actions in the various use situations.

3.2 Chess Servers on the Web

In parallel with the above-mentioned formal language study, we also performed an analysis of some of the most prominent open (free of charge) online chess servers from the point of view of both interface and interaction. The environments we analysed were those that allowed for interaction – including the game itself – by using a browser.

The main purpose of such analysis was to list the existing functionalities and identify the ones considered indispensable for a chess environment of this kind. Even though these environments do not have the same purpose as our hypothetical server – whose aim is educational –, they revealed functionalities and basic requirements that must be offered to chess players in general.

3.3 What Specialists and Server Users have to Say

The team that worked on the development of the XadrezLivre chess server is multidisciplinary, and consists of sub-teams in charge of the Server (managed by specialists and senior users of the chess community), Database, Coding, Human-Computer Interaction and Education. This collective view, inherent to the project, allowed for the design of the interface environment with the ongoing participation of different users profiles in the process.

The contribution of the senior users of the server who took part in the meetings, we can say that they have been using the system since its implementation, also playing the role of system managers. Because they are thoroughly acquainted with the community, they were fully able to point out some of the usual difficulties beginners and intermediate users face during the interaction with the system. Besides, they helped us to choose the functionalities by means of a classification by relative frequency relevance of the FICS commands.

As for the specialists and educators was rather significant, assisting us in the selection of terminology and identification of features necessary to the game environment so as to fulfil the objective of our project, i.e. to support the teaching of chess in schools.

Figure 1: Interface and interactive environment solution for the project's chess server.

4 SOLUTION DESCRIPTION

The methodology used allowed us to develop a solution for the interface and interactive environment for the projects chess server in accordance with our main objective – of supporting chess teaching in schools. Figure 1 shows the layout of the main screen and its windows.

It is essential to point out that the entire design of the environment, including the board and pieces, was elaborated especially for the project. Figure 1 shows that we placed special emphasis on the access to context information of the communitys activities, denoting the innovating nature of this technological tool that allows for direct access to contextually significant information. This was possible thanks to the selection and remodelling of functionalities combined with the design of the interface elements, which in turn are parts of the methodology that shall be described next.

4.1 Board: The Game Environment

The board constitutes the very game environment. As we show in Figure 1, the board takes the central portion of the environment. It includes a clock for each player, the names of the players, a key of symbols concerning the colours of the pieces, a window displaying the PGN (Portable Game Notation) moves and a window that displays the punctuation during a match.

A typical problem of online chess environments is when newcomers are instantly invited to play by ill-intentioned experienced players. This happens because such experienced users want to accumulate more victories, thus bettering their rating. This bad conduct makes the environment unfavourable for learners, discouraging them from playing. The interface solution we used to try to combat this problem is the following: the moment a beginner is invited to play by an experienced learner (which can be easily visualized through the players ratings), the former gets a message in his/her game settings window warning him/her of the possibly ill intention of the latter, thus avoiding the complete "massacre".

Once the match is over, an important feature – vis--vis the teaching-learning environment – is the possibility to take notes during the match and then save them. This enables both user-learners to take notes of what might have been their flaws, and teachers to write comments while watching a match, so that they can use them later in class or simply make them available for students.

4.2 User's Profiles

The user's profiles of the vast majority of the online chess environments are classified in such a way that does not include learners. Furthermore, in many of such servers the different users profiles are displayed through text interface, thus allowing for differentiation by means of special characters, such as an aster-

isk right next to a nickname. Since there usually are a great number of profiles (some servers have from 10 to 15), it is extremely difficult to differ simply by adding a special character.

Since our suggested solution privileges the active learner profile, we had to re-elaborate all users profiles, which eventually led us to a list of 5 profiles, as follows: the Manager, in charge of the well-being of the system; the Robot, that allows other users to invite him/her to play to help him/her to practice; the Helper, whose main task is to help newcomers to use the environment; the Teacher, who is in charge of giving tips and developing a teaching environment within the server; and the common User.

The STATUS column displays the solution for different players statuses. As we show in Figure 2, they may be "busy", "available", "absent", "not available to play", "participating in a tournament", and "watching match".
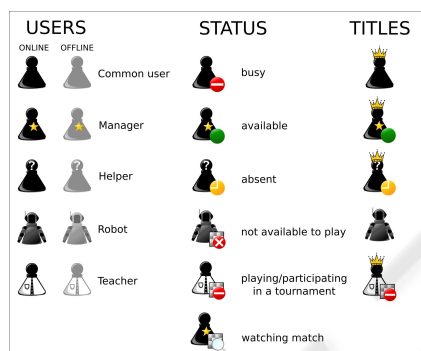

Figure 2: Different icons for different profiles, status and titles.

Most chess servers attribute titles to their users according to the tiles they have in real life (Grand Master, International Master, among others).

However, such hierarchy is not clear for inexperienced users. Therefore, in order to soften the difficulty our interface solution includes different icons for each profile, and they can be distinguished through other symbols (such as a crown) when the user has a specific title, as shown in the column "TITLES" of Figure 2. Considering that most chess servers have more than 5 types of titles, instead of unnecessarily overloading the list of users/contacts we preferred to have our solution communicate whether users have titles or not, displaying the type of title only when detailed information is requested, which can be done easily by means of the specific icon.

4.3 Top Contact Bar

Aiming at providing users with direct access to the contextually significant actions by means of strategic and operational help, we inserted a context bar on the top portion of the environment.

Thanks to the methodology we adopted, we were able to choose the most significant functionalities for the entire environment, which in turn were placed in the context bar, mostly. Each option of the bar has its respective menu of available actions for each user.

The first option of the context menu bar is "Ongoing matches". The environment interface allows users to directly access the ongoing matches by clicking this button. Its corresponding menu displays the ongoing matches stored in the system, which naturally can be observed by other users. Right next to it is the "Announced matches" option, through which the interface displays a list of announced matches. The interface also allows users to have access to such matches and to accept the ones they wish to. Quick access to a certain match is possible in a rather simple way, as follows: when users want to be challenged, the interface allows them to announce a match as well as the settings chosen for such match. The third button of the context bar is entitled "Tournaments", whereby all ongoing tournaments are displayed (also allowing users to check the ongoing matches), as well as scheduled tournaments. This way, users can register quite easily simply by double clicking the chosen tournament. The last option of the context bar is "Rooms", where the users may send and receive messages to a certain user or to all users present in the chat room in which they are taking part.

4.4 Interactive Monitor: Help for Learners

The vast majority of chess environments available does not instruct learner-users when they are faced with difficulties whilst playing, be these difficulties due to distraction or due to lack of knowledge of the rules or of game experience.

As a solution for the abovementioned shortcomings we propose the addition, to the interaction and interface environment, of an interactive monitor to help learners. Such help plays the role of a metaphorical teacher who watches his/her students matches and comments on key moments of the game, i.e. those moments in which learners are prone to make mistakes. We specified certain error situations by means of a classification of common errors typical of learners.

For example, impossible moves and an instance of

it is when players misplace a piece. The online chess environments do not allow users to misplace pieces by automatically placing them in their original position, giving users a second chance to make their move. However, despite the fact that the system takes such action, it does not inform users as to the reason why their move was not allowed, nor does it help learners to improve their knowledge of the correct position of chess pieces.

In the proposed chess environment, the idea is to monitor the abovementioned situations, providing user-learners with the necessary help by means of messages and warnings containing the information required to fulfil their lack of knowledge. The purpose of this monitor is not to make users more competitive, not is it to make them less eager. The objective of the interactive monitor is rather to warn users both in dangerous situations and in situations of error by hinting at the solution without, however, giving out the whole answer.

5 CONCLUSIONS AND FUTURE PERSPECTIVES

Departing from the initial hypothesis problem that learners have difficulty getting motivated to fully enjoy chess server environments – which is so often mentioned in the computer-based chess community –, we strived to find a theoretical basis in Human-Computer Interaction and particularly in Semiotics Engineering to develop an interface and interactive environment capable of privileging communication among and with user-learners, which in turn constituted the main objective of our server – thus attending to the needs of this specific profile.

The methodology we developed especially for building the interface had its grounds in the differential features of the project, or more specifically in the existence of a formal language (FICS) with full expressivity for the chess community, as well as in the multi-disciplinary nature of our team, which in turn allowed for the ongoing and active analysis of different potential users profiles all through the design process. This way, we carried out the studying, classification and modelling of the formal language in parallel, and we also performed the empirical analysis of the features of chess servers available on the Internet, as well as a study to develop a resourceful game environment which fulfills the lack of knowledge of learners during games. Our methodology, which used alternatively the top-down and bottom-up approaches, was gradually shaped during the periodic meetings with different users, whose main purpose was to determine the importance and relative frequency of the commands, the most common terms used in the chess community, as well the learners specific needs, among other things.

Therefore, the interface and interaction environment we developed meets the needs of a community whose main concern is to privilege learner-users. Such concern becomes clear in the interface through the interactive monitor that provides users with help during games by warning them about typical error situations; and through the bar of context menus, which in turn displays the entire potential of the environment basically by means of the context information, providing users with direct access to actions semantically associated to each menu.

Future works in this area should approach the implementation of the environment (which is already being carried out), as well as the shift between competition and cooperation with educational purposes.

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