Prototyping an Adaptive Educational Game for Conflict Resolution

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Abstract. The SIREN project aims at developing a serious game which educates young people on how to resolve conflicts. At ITU we design a social multiplayer sub-game that revolves around the everyday life within a virtual village. Since the applicability of theoretical models of conflict to the interaction space of a digital game is limited, we implemented a prototype that allows for a better modeling of the actual user experience. The prototype fits well into an iterative design process, since it allows for gathering data from actual use cases which will inform the design of the final adaptive system.

1 The SIREN Project: Teaching Conflict Resolution

Being able to resolve interpersonal conflicts in a constructive manner is a vital social skill which is best taught in early years, using teaching tools that are appropriate and engaging for children. The SIREN project [1] aims at developing a serious game which supports teachers to educate young people on how to resolve conflicts.

Both conflict experience and conflict resolution involve a wide range of emotional states. In [2] we described five phases involved in our conflict modeling process. Each phase requires affective player modelling for an adaptive software to be able to react appropriately. This is especially true for an educational game about conflict where these emotions can not be left to chance.

The final SIREN serious game will consist of several minigames, interconnected by a common diegesis. At ITU we design a social multiplayer game that revolves around the everyday life within a virtual village. Players take the roles of villagers, and will become engaged in conflicts that arise from resource concurrency as well as from the social interdependecies of the characters. The game design is informed by theoretical models of conflict [2] as well as role-playing exercises conducted with the target audience. However the applicability of these findings to the interaction space of a digital game is limited. A prototype game allows for a much closer modeling of the actual user experience.

2 Prototype Requirements

A first technology demonstrator for an adaptive serious game for teaching conflict resolution has been presented by Grappiolo et al. in [3]. The function of its

successor in the game design process is to provide an overall experience matching that of the final product as much as possible. It is being built to serve two purposes: a) to allow the target audience to preview the game, and gather early feedback on conceptual and visual design, handling, and the ability to evoke emotional responses, and b) to collect qualitative and quantitative feedback on example conflict scenarios. The analysis of these data sets will be used to devise conflict intensity detection heuristics and inform the design of the user model.

These two demands lead to a set of mandatory features to be implemented. The prototype has to be of *multiplayer capacity*, *visually convincing*, and incorporate *resource management* as well as *social interaction*. Technical requirements are the ability to *record* and *play back gameplay*, as well as logging a rich set of *interaction data* to infer the emotional user model from.

This comprehensive list of demands naturally conflicts with the ubiquitous constraints of a research project. The *time frame* is limited, calling for rapid prototyping techniques. The prototype production must be *cost-effective* and *consume little manpower*.

3 Implementation and Status

3.1 Graphics

Practical games research often suffers from a *content bottleneck*, as most of the time there are no means to obtain commercial-grade graphics, sounds, and dialogue, especially for prototypes. The village game protoype solves this by using the "PlanetCute" library of 2D game art released by a professional graphic artist under a permissive license.[1] For the sake of a quick implementation, the prototype features no sound effects, music, or voice acting.

3.2 The Game Engine

The village game prototype is being implemented using *Fabula*[2], a game engine specifically designed to be used in teaching and research [4].

The amount of work required to develop an open world game where players can freely move on a map and interact with the environment is determined by the underlying software framework. The Fabula engine already comes with a world model and a number of interactions commonly found in adventure games. In our case it required comparatively little work to get a 2D multiplayer game up and running.

3.3 Sources of Conflict

The game design for the village game centers around the paradigm of scarce resources and the possibility to permanently steal or damage property. This has

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[1] http://www.lostgarden.com/
[2] http://fabula-engine.org/

a significant potential for strong emotions and conflicts, as reported by the target audience [5]. A believable and consistent in-game economy is a requirement for this design to work.

The prototype uses iconic items to represent resources. *Trading* is a way to obtain missing items from other players, introducing a *cooperative strategy* for resource conflicts. On the contrary, *damaging* other players' homes and *stealing* resources from their storage induces new conflicts, or aggravates existing ones.

Another source of conflict are the social relations between characters. The prototype allows this to emerge through the inclusion of two mechanisms: a quantified *social network*, and the ability to *spread rumours* about a character.

The user and conflict models are implemented as collections of simple scalar values which are tracked over time. Along with counters for proposed and accepted trades, thefts carried out, the social network relations and the rumour history, the model maintains a number of indirectly calculated metrics, such as *livelihood*, derived from economic activity, or *reputation*, derived from social interactions.

Figure 1 shows a screenshot of the prototype, with two players playing.

Fig. 1. Screenshot of the village game prototype.

4   Current Work: Crowdsourcing for Conflict Heuristics

At the current point of our research it is not yet clear which player actions and in-game social interactions are good predictors for conflict stages and conflict intensity. As these are constitutional for the later player and group model to work, we are undertaking a *crowdsourcing* approach using the prototype.

For this purpose we are preparing three conflict scenarios that are based on common real-life conflict experiences as reported by the target audience [5]. We will record commented gameplay that illustrates several developments of the initial conflict settings. These recordings will be shown to members of the target audience with frequent requests to annotate the perceived current state and intensity of the conflict, emotions towards characters and actions, and how the viewer would feel in place of the main characters.

5   Conclusion

Implementing a working adaptive system without any prior knowledge of the nature of the interaction is not feasible. That is why the development of these systems calls for an iterative design process. Our prototype fits well into this paradigm: following an initial design phase, it enables us to gather data from actual use cases. From these we will be able to devise an adaptive system that operates well within the boundaries derived from the measurements.

References

1. Yannakakis, G.N., Togelius, J., Khaled, R., Jhala, A., Karpouzis, K., Paiva, A., Vasalou, A.: Siren: Towards adaptive serious games for teaching conflict resolution. In Meyer, B., ed.: Proceedings of the 4th European Conference on Games Based Learning. (2010)
2. Cheong, Y.G., Khaled, R., Grappiolo, C., Campos, J., Martinho, C., Ingram, G.P.D., Paiva, A., Yannakakis, G.: A computational approach towards conflict resolution for serious games. In: Proceedings of the 6th International Conference on Foundations of Digital Games. FDG '11, New York, NY, USA, ACM (2011) 15–22
3. Grappiolo, C.: Towards player adaptivity in a serious game for conflict resolution. In: Games and Virtual Worlds for Serious Applications (VS-GAMES), 2011 Third International Conference on. (2011)
4. Berger, F., Müller, W.: Towards an open source game engine for teaching and research. In Chang, M., Hwang, W.Y., Chen, M.P., Müller, W., eds.: Edutainment Technologies. Educational Games and Virtual Reality / Augmented Reality Applications. Volume 6872 of Lecture Notes in Computer Science. Springer Berlin / Heidelberg (2011)
5. Vasalou, A., Ingram, G., Khaled, R.: User-centered research in the early stages of a learning game. In: Proceedings of the ACM Conference on Designing Interactive Systems 2012. (2012)