Review of the dissertation thesis

Author: **Mgr. Jakub Gemrot**

Title: **Controlling Virtual People**

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Jakub Gemrot has been working on the problem of action selection for **human-like virtual agents** for more than a decade. This thesis is a natural culmination of his work and can be rightly viewed as **magnum opus of reactive planning**. Based on his deep insights, Jakub has constructed a new, theoretical "umbrella language" for reactive human-like agents, **BDL**, that can be used to compare different reactive planning approaches/languages, formally define language features, formally calculate code "development complexity", develop new features and more complex "design patterns", and program agent behavior. The versatility and flexibility of BDL is what distinguishes it from other agent programming languages (as well as its focus on human-like virtual characters).

In the thesis, Jakub develops his language gradually, step-by-step. After introduction to the domain, i.e., virtual characters, computer games and intelligent software agents (Chapter 1, 2), he walks the reader through several preparatory phases (Chapters 3 – 6), before he finally introduces the BDL (Chapter 7). At page 167, the beginning of Chapter 7, the reader can start wonder whether the previous parts could not have been described more concisely. The present version of the thesis is already an outcome of several rounds of substantial rewrites; yet, I think there indeed is some room for further improvements in the terms of structure and conciseness.

In Chapter 8, Jakub models several notable action selection languages/approaches using BDL. By doing so, he not only further documents shortcomings of previous approaches and identifies possibilities for improvements, but he also demonstrates theoretical applicability of his language. However, the reader is left wondering why approaches to modeling general cognitive architectures have not been considered; SOAR may be a good example because it has been previously employed in games.

I would thus like to ask the author how SOAR would fare when modeled using BDL? What decision-making patterns in the terms of Table 3 (page 337) would it support? Moreover, could SOAR be used to model BDL?

The thesis eventually introduces several advanced decision making patterns (Chapter 9) and concludes with an example implementation (Chapter 10) and approaches to practical evaluation (Chapter 11). With respect to that, it has to be said that this thesis is primarily theoretically focused. Given the gargantuan amount of the theoretical work that had to be done (Chapters 1 – 9; approx. 350 pages), actual implementation of the BDL language, and thus also its practical evaluation, is only sketched. Evaluation in Chapter 11 is valuable, but strictly speaking, it constitutes grounds for developing BDL rather than evaluating it. Thus, there is a plenty of room for possible future work (i.e., beyond the scope of the present work).

As concerns formal issues, formatting of the thesis could have been better and the thesis would benefit here and there from proof-reading. However, no-one is perfect.

Generally, this is a fair thesis with a substantial contribution to the field of modeling behavior of human-like virtual agents. The thesis is well written and well situated in the current literature.

I **recommend** the work for defense and I believe the author **should be awarded** the Ph.D. degree.

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