

AIBirds 2014 -Team IHSEV: Description

Mihai Polceanu is a PhD. student at the National Engineering School of Brest, working at the CERV (European Center for Virtual Reality). His work focuses on applying human-inspired mental simulation to computational decision making in virtual agents. His research interests include Artificial Intelligence, Virtual Reality, Multiagent Systems and Computer Vision.

Cedric Buche is an Associate Professor (HDR, CNU 27) at the National Engineering School of Brest, member of the IHSEV team of the LAB-STICC Labs UMR 6285 - CNRS. He is also member of the CERV and Editor-in-Chief of the International Journal of Virtual Reality (IJVR). His research interests include Artificial Intelligence, Virtual Reality, Adaptive Behaviors and Multiagent Systems.

The AIBirds agent developed by the IHSEV team incorporates principles from the thesis work of Mihai Polceanu, under the supervision of Cedric Buche and Ronan Querrec, based on using mental simulation in a computational context, with a long term goal of achieving a generic framework for believable decision making and creativity.

Our approach for the 2014 edition of the AIBirds contest consists in an improvement in object recognition over the Naive Agent provided by the organizers, such that game objects are more robustly identified (including the newly introduced hollow blocks and triangles). Based on the information provided by the perception module, the agent creates what we refer to as an “Imaginary World” in which mental simulations can be performed. The model which makes up the imaginary world consists in the perceived scene structure (objects, birds, pigs, scenery) and physical laws that govern the objects' motion. Mental simulations represent independent executions of this functional model and lead to a future state of the environment which can be evaluated. Our agent is able to perform multiple parallel simulations to test different courses of actions, and chooses the one that best suits its goals. Although the model does not perfectly reflect the reality of the game, and errors are bound to build up during each simulation, the agent's performance is not drastically decreased; caution must be taken however to assure that the perception data is as complete as possible (hence the improvements made to the Naive Agent) in order to obtain satisfactory results.

Results from ANU Open Day 2013 Man vs Machine Challenge (<https://aibirds.org/other-events/anu-open-day-2013.html>), where all 8 finalists of the AIBirds 2013 contest participated versus human players, showed good performance of our agent. Also, we observed interesting behavior from testing, such as “smart” solutions on certain levels, where the agent took advantage of the scene setup to find non-trivial shots.

The limitations of our agent are introduced by imperfect perception and errors caused by the lower level of simulation detail.

More information about the theoretical framework behind our agent's implementation can be found in our paper: <http://arxiv.org/abs/1405.5048>