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Virtual gamer bot beats Turing's 'human' test

Posted By <u>Daniel Oppenheimer-U. Texas</u> On October 1, 2012 @ 12:21 pm In <u>Science & Technology</u> |
<u>1 Comment</u>

U. TEXAS – AUSTIN (US) — An artificially intelligent virtual gamer has won the BotPrize by
convincing a panel of judges that it was more human-like than half of its human opponents.

The competition was sponsored by 2K Games and was set inside the virtual world of "Unreal
Tournament 2004," a first-person shooter video game.

"The idea is to evaluate how we can make game bots, which are non-player characters (NPCs)
controlled by AI algorithms, appear as human as possible," says Risto Miikkulainen, professor of
computer science at the University of Texas at Austin.

Miikkulainen created the bot, called the UT^2 game bot, with doctoral students Jacob Schrum and
Igor Karpov.

The bots face off in a tournament against one another and about an equal number of humans,
with each player trying to score points by eliminating its opponents. Each player also has a
"judging gun" in addition to its usual complement of weapons. That gun is used to tag opponents
as human or bot.

The bot that is scored as most human-like by the human judges is named the winner. UT^2,
which won a warm-up competition last month, shared the honors with MirrorBot, which was
programmed by Romanian computer scientist Mihai Polceanu.

The winning bots both achieved a humanness rating of 52 percent. Human players received an
average humanness rating of only 40 percent. The two winning teams will split the $7,000 first
prize.

The victory comes 100 years after the birth of mathematician and computer scientist Alan Turing,
whose "<u>Turing test</u> [1]" stands as one of the foundational definitions of what constitutes true
machine intelligence.

Turing argued that we will never be able to see inside a machine's hypothetical consciousness, so
the best measure of machine sentience is whether it can fool us into believing it is human.

"When this 'Turing test for game bots' competition was started, the goal was 50 percent
humanness," Miikkulainen says. "It took us five years to get there, but that level was finally
reached last week, and it's not a fluke."

Irrational behavior

The complex gameplay and 3D environments of "Unreal Tournament 2004" require that bots
mimic humans in a number of ways, including moving around in 3D space, engaging in chaotic
combat against multiple opponents, and reasoning about the best strategy at any given point in
the game. Even displays of distinctively human irrational behavior can, in some cases, be
emulated.

"People tend to tenaciously pursue specific opponents without regard for optimality," Schrum says.
"When humans have a grudge, they'll chase after an enemy, even when it's not in their interests.
We can mimic that behavior."

In order to most convincingly mimic as much of the range of human behavior as possible, the
team takes a two-pronged approach. Some behavior is modeled directly on previously observed
human behavior, while the central battle behaviors are developed through a process called
neuroevolution, which runs artificially intelligent neural networks through a survival-of-the-fittest

gauntlet that is modeled on the biological process of evolution.

"In the case of the BotPrize," Schrum says, "a great deal of the challenge is in defining what 'human-like' is, and then setting constraints upon the neural networks so that they evolve toward that behavior.

"If we just set the goal as eliminating one's enemies, a bot will evolve toward having perfect aim, which is not very human-like. So we impose constraints on the bot's aim, such that rapid movements and long distances decrease accuracy.

"By evolving for good performance under such behavioral constraints, the bot's skill is optimized within human limitations, resulting in behavior that is good but still human-like."

Miikkulainen says that methods developed for the BotPrize competition should eventually be useful not just in developing games that are more entertaining, but also in creating virtual training environments that are more realistic, and even in building robots that interact with humans in more pleasant and effective ways.

Source: [University of Texas at Austin](http://www.utexas.edu) [2]

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[1] Turing test: **http://en.wikipedia.org/wiki/Turing_test**
[2] University of Texas at Austin: **http://www.utexas.edu/news/2012/09/26/artificially-intelligent-game-bots-pass-the-turing-test-on-turing%E2%80%99s-centenary/**