Game Balancing Theory

Making a non-computer or computer game fair for players vs. player, or player vs. computer

AdamCon 17
July 15, 2005
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Game Balancing Theory

- Player vs. Player games establishes a relationship between the players which the player tries to exploit.
- There are four basic strategies for balancing p vs.p games
  - Symmetric relationship
  - Asymmetric relationship
  - Triangularity
  - Actors and indirection

Game Balancing Theory

- Symmetric relationship
  - The simplest architecture with each player with identical strengths and weaknesses. (One on one basketball, Rocky)
  - This type of game is automatically balanced.
  - Suffers from a relative simplicity
    - Any successful strategy for one side can be used by both sides
    - Success is derived from execution, not strategy
    - Or success is derived from fine details (a pawn in Chess)

Game Balancing Theory

- Asymmetric relationship
  - Each player has unique advantages and disadvantages.
  - Must balance both sides to have same likely-hood of victory, given equal levels of skills
  - A simple way to do this via plastic asymmetry, with an initially symmetric conditions, which are customized with a set of initial traits according to some set of restrictions.

Game Balancing Theory

- Triangularity
  - Non-transitive or triangular relationship
  - For example Rock-Paper-Scissors
- Pure triangulary does not provide that much interest
- Most often implemented as a combination of offensive and defensive strengths/weaknesses

Game Balancing Theory

- Actors and Indirect Relationships
  - Actors are computer controlled characters.
  - Indirection is where the player gives the actor a set of instructions and the actor engages in direct battle.
- The disadvantage is that the player is left to watch the battle, instead of being directly engages
- Works well with complex scenario where there is a large number of actors involved.

Game Balancing Theory

- Player vs. computer games pits two very different types of opponents against each other.
- The thought processes of a human player is “diffuse, associative and integrated”
- The thought processes of the computer is “direct, linear and arithmetic”

Game Balancing Theory

- Creating a game that a human would enjoy, puts the computer at a disadvantage.
- Imaging the following game:
  - Count all of the numbers from 1 to 1,000,000
- Easy for the computer, tedious for the human.
- Imagine the game: minesweeper
  - Interesting and easy enough for the human, tricky for a computer to play. As a result the human can play easier.

Game Balancing Theory

- There are four strategies to balance p vs. c games.
  - Vast resources
  - Artificial “smarts”
  - Limited information
  - Pace

Game Balancing Theory

- Vast resources
  - Computer is provided vast resources which it uses stupidly
  - The computer uses many opponents with rudimentary intelligence (Slither, Defender, Space Fury, etc.)
  - Or the computer uses a one or a few really powerful opponents with rudimentary intelligence. (Zaxon, Donkey Kong, Mouse Trap)
- Gives a David vs. Goliath air
- Easy to implement.

Game Balancing Theory

- Artificial smarts
  - Cheaper than the moving mark of fully “Artificial Intelligence” (Trolls Tale, Destructor, Chess, etc.)
  - Must produce reasonable behavior in every situation
  - Be unpredictable
    - Moves should be created based upon context and other player's moves
- Must use C&O algorithms to compute the next move in a reasonable amount of time
  - Combinatorics and Optimization: spatial algorithms like shortest path, decision trees pruning like alpha/beta searching, etc.

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- Limited Information
  - If the human player doesn't have the information, then he cannot apply his superior reasoning to the situation (Antarctic Adventure, Turbo, etc.)
  - If applied to excess it turns the game into a game of chance
- Tickles the imagination of the player
  - Random gaps in information will be confusing, so the hidden information must be artfully chosen

Game Balancing Theory

- Pace
  - The human may be smart, but the computer is fast at doing simple computations. (Tetris, Adictus, etc.)
- This technique is very easy to use, but has the disadvantage that it limits the player's involvement in an immersive experience

Game Balancing Theory

- Further reading: “The Art of Computer Game Design” by Chris Crawford, 1982
  - Available as a PDF from Washington State University at Vancouver (WSUV) transcribed by Sue Peabody, department of History