Can We Prevent Collusion in Multiplayer Online Games?

Jouni Smed, Timo Knuutila and Harri Hakonen

University of Turku, Finland

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Espoo, Finland
Computer Games Research Group in University of Turku

- Founded 1999
- Focuses on algorithms and networking in computer games
- Teaching:
  - courses: game algorithms, multiplayer games
  - seminars: game AI, interactive storytelling, game development project
  - MSc theses, BSc theses...
- Research results:
  - invited talk presented in GC Developer Conference, Leipzig, 2006
  - chapter in *AI Game Programming Wisdom 2*, 2003
  - ACM SIGCOMM NetGames Best Paper Award, 2004
  - journal articles, conference papers...
Co-operation and collusion

- **Forms of co-operation**
  - soft play
  - alliancing, ganging
  - expert help, scouting
  - self-sacrificing support

- **If co-operation is not allowed by the rules of the game, it is collusion**
  - collusion = covert co-operation
Example: Co-operation in *Age of Empires*

- Forming alliances
- Sharing knowledge
- Donating resources
- Sharing control
- Providing intelligence
Key questions about collusion

- What are the different types of collusion?
  - different types seem to be lumped together in the literature

- How to detect collusion reliably?
  - finding algorithms that recognize intentional behaviour from unintentional

- How to detect collusion as early as possible?
  - to minimize the harm done by colluders

- How to prevent collusion?
  - the co-operation between the maintenance and collusion detection mechanism
Roles in collusion

- We must discern the roles of partakers in a game
  - player $\neq$ participant

- Two types of collusion
  (i) collusion among the players
    - collusion happens inside the game
    - analyse whether the players’ behaviour diverges from what is reasonably expectable
  (ii) collusion among the participants
    - collusion happens outside the game
    - analyse the participants behind the players to detect whether they are colluding
Players and participants

Instance of the game

Players

Participants

Human

Bot

Sweatshop
Level of agreement

- **Express collusion**
  - explicit hidden agreement

- **Tacit collusion**
  - no agreement but common interests
  - example: attacking the strongest/weakest opponent

- **Semi-collusion**
  - collusion on certain areas, competition on other areas
  - example: sharing a resource site, battling elsewhere
Content of agreement

- Concealed stance
  - different play method against a co-colluder than against other players

- Knowledge sharing
  - colluder gets more information than peers

- Information sharing
  - colluders exchange in-game information

- Resource sharing
  - colluders exchange in-game resources
Classification

- There are limitations in the previous classifications
  - aim at capturing the motive of collusion
  - problem: motive depends on the context and the player’s mindset → often subjective: how can you see inside the colluder’s mind?
- We classify collusion based on *how it works*
  - participant identity collusion
  - inter-player collusion
  - game instance collusion
Participant identity collusion

- How a single player is perceived to participate in a game?

(i) Player controller collusion

- the player is not controlled by a single human participant
- example: bot, sweatshop, boosters, analysers

(ii) Self-collusion

- a single participant controls multiple players
- example: throw-away characters, double-playing in poker
Inter-player collusion

- How the participants are affecting the game?

  (i) Spectator collusion
  - co-colluder provides a different type of information
  - example: ghost scouting, post-game information

  (ii) Assistant collusion
  - co-colluder plays (sacrificingly) to assist the other to win
  - example: sidekick, passive scout, spy

  (iii) Association collusion
  - co-colluders achieve individual goals through co-operation
  - example: specialization to complement each other
Game instance collusion

- How factors outside the game instance affect the game?

  (i) Multigame collusion
  - players of different game instances collude
  - example: studying the game properties, finding suitable server, fixing tournament match results

  (ii) Insider collusion
  - co-colluder is an administrator or game developer
  - example: slips from the helpdesk
Classifying the methods used in collusion detection

- **Participant identity collusion**
  - sweatshop »» intrusion monitoring
  - illicit use of bots »» CAPTCHA, public steganography
  - automatized tools »» detecting repetitive and monotonic action chains (hidden Markov models)

- **Inter-player collusion**
  - spectator collusion »» delayed feed
  - assistant collusion »» sting operations, game-playing traps
  - association collusion »» varying game content, player profiles

- **Game instance collusion**
  - multigame collusion »» controlling player accounts
Concluding remarks

- Situation is not as pessimistic as one would think reading the literature
  - our classification clarifies the focal points
- Still, there is a lot of work to be done
  - developing mathematical models
  - designing collusion detection methods
  - testing the methods in real-time environments
- Online multiplayer games need a third-party organization (like WADA) that grants and manages player-licences
Please ask us more about it!