Bot detection in Online Gaming

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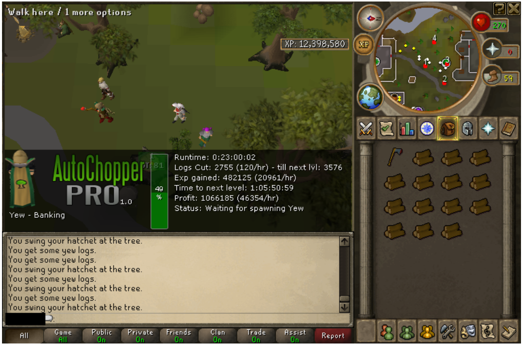
The big picture

- What are automated bots and why do we want to detect them?
- Why are they bad for online games?
- Server-side detection
- Review two bot detection approaches



Runtime: 0:23:00:02
Logs Cut: 2755 (120/hr) - till next lvl: 3576
Exp gained: 482125 (20961/hr)
Time to next level: 1:05:50:59
Profit: 1066185 (46354/hr)
Status: Waiting for spawning Yew

```
You swing your hatchet at the tree.
You get some yew logs.
You get some yew logs.
You swing your hatchet at the tree.
You get some yew logs.
You swing your hatchet at the tree.
You get some yew logs.
You swing your hatchet at the tree.
[redacted]:
```

Game: Runescape
`http://tinyurl.com/leqhmtj`

Outline

1. Automated Botting
2. Server-side Detection and Terminologies
3. Waypoints with Path Segments
4. Party Play Analysis
5. Conclusions

Outline

1. Automated Botting
    - What is an automated bot?
    - Which games do they target?
    - Why are bots used?
2. Server-side Detection and Terminologies
3. Waypoints with Path Segments
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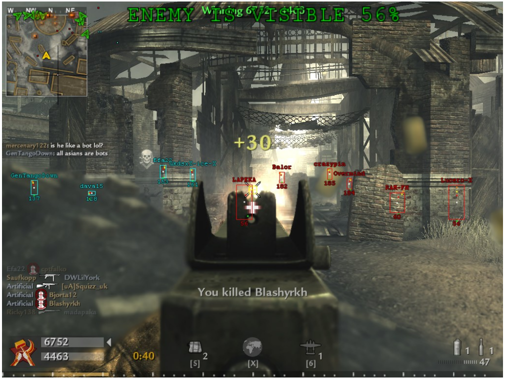
Automated bot

- A program that plays the game
- Bots are scripted to do very specific tasks
- Bots primary target large player-base games
- Bot examples: Aim Bot, Farm Bot



mercenary122: is he like a bot lol?
GenTangoDown: all asians are bots

http://tinyurl.com/oyonmj3

Massively multiplayer online games (MMOGs)

Game: World of Warcraft
`http://tinyurl.com/lya55es`

Players are in it for:

- fun, and
- to compete against each other

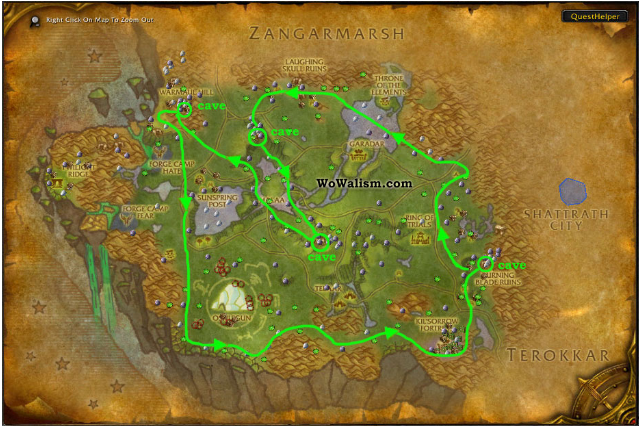
Introduces:

- repetitive tasks

Bots can perform specific tasks

Can easily perform repetitive task

- example: gathering resources and fighting monsters



Game: World of Warcraft
`http://tinyurl.com/ljj7m7l`

What harm are they to a game?

- Bots are used to gain advantages over legitimate players
- They take away the fun and competitiveness making the game lose its purpose
- Legitimate players leave the game and game developers lose revenue
- Game developers have to constantly create new detection and prevention methods

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   - Terminologies
   - Server-side detection
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Terminologies used in detection approaches

- *Online Game*: always running on the server-side; a connection between a game and its clients where information is sent between them
- *Action*: an interaction inside the game by the player; actions are information and is sent to the game, examples: talking, attacking, being blocked by virtual objects
- *Timestamp*: the real time taken when information is sent
- *Coordinate*: a set of numbers identifying where the player is located in the game; a movement is a set of coordinates

Server-side detection

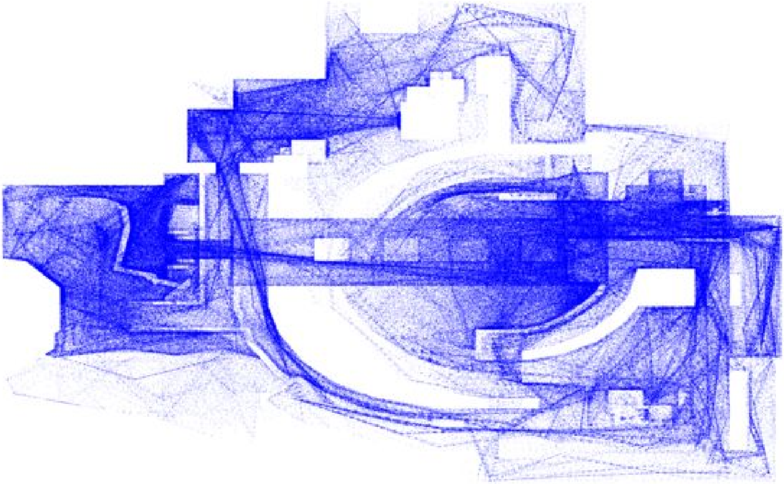
Hidden from players and has low computational cost

Analyzes information from logs

Log

- Contains information of everything pertaining to the game
- Has client information
- Available only to game developers

Log Example



Game: Quake II
`http://tinyurl.com/m6gqx2c`

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2 Server-side Detection and Terminologies

3 Waypoints with Path Segments
- Overview
- Algorithm
- Performance evaluation

4 Party Play Analysis

5 Conclusions

Waypoints with Path Segments Overview

Movement analysis approach

Focus on the repetitive movements of bots

Algorithm takes the following steps:

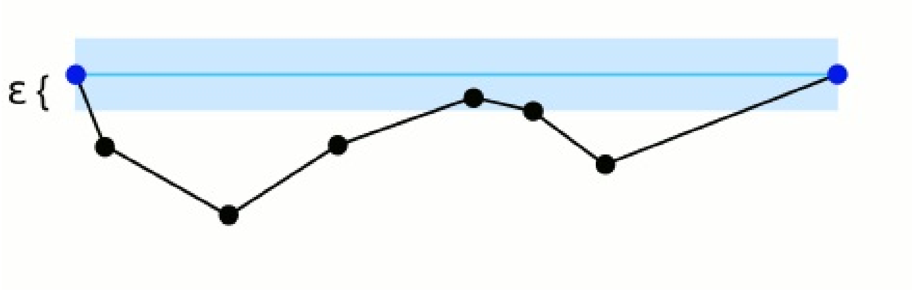
1. Simplifies a movement
2. Find waypoints of the simplified movement
3. Find the average path segment measurement of the simplified movement

Ramer-Douglas-Peucker Line Simplification Algorithm

A movement from a log can be represented as path

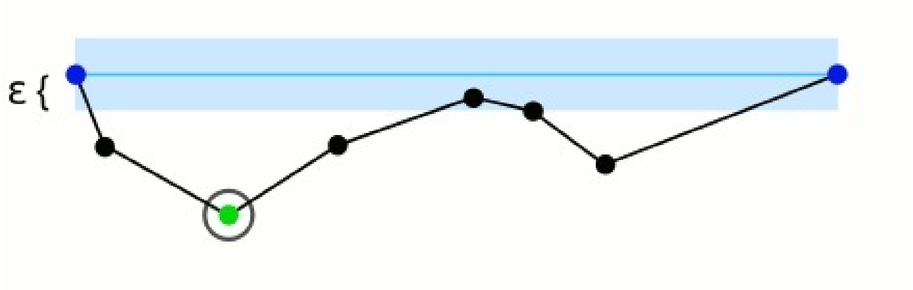
- Use to simplify a path
- Important for removing clusters at close intervals
- Examples of close-interval actions: moving slowly, not moving, and being blocked
- Result: simplified path that represents our movement

RDP Algorithm Example



http://tinyurl.com/7ohrq54

RDP Algorithm Example



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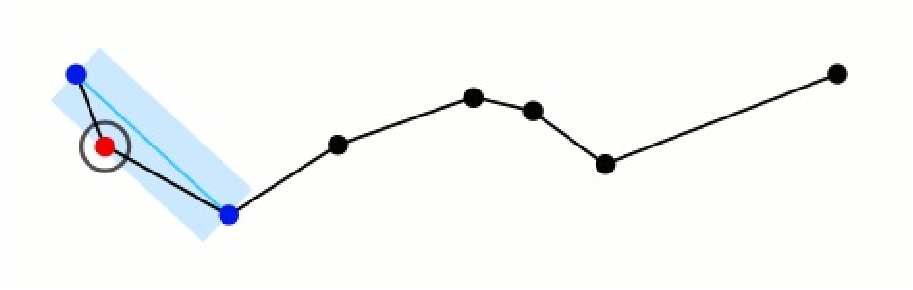
RDP Algorithm Example



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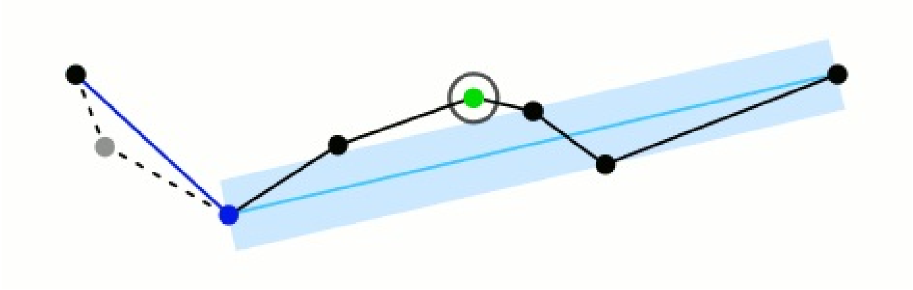
RDP Algorithm Example



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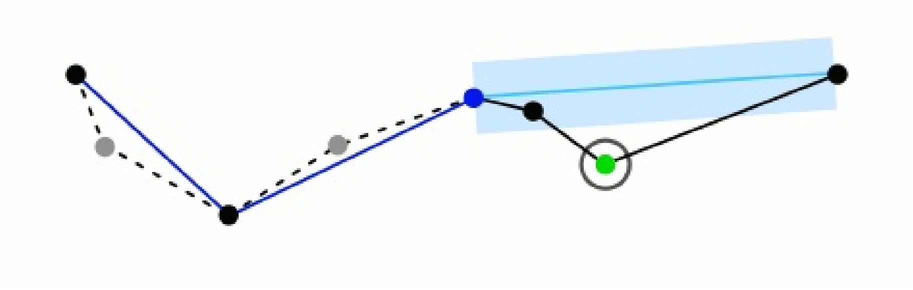
RDP Algorithm Example



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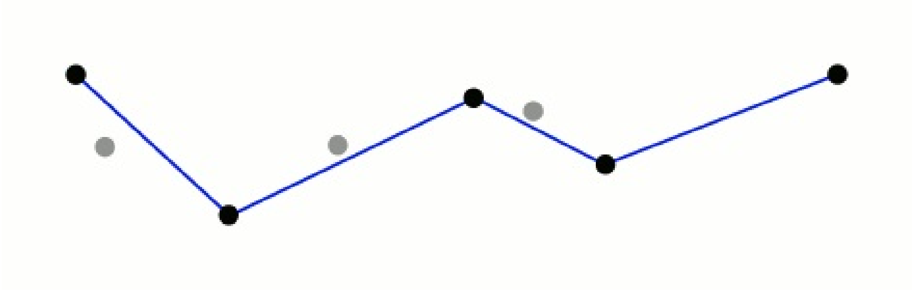
RDP Algorithm Example



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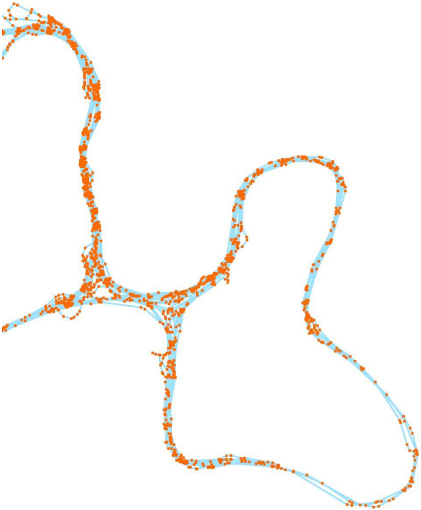
Simplified Movement

- A custom clustering algorithm based on k-means algorithm is used to find clusters



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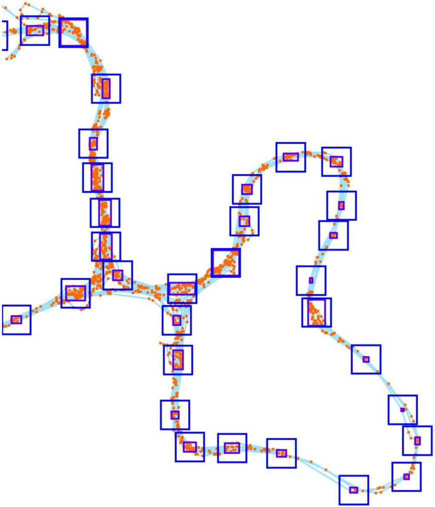
Waypoints

- Constructs waypoints for clusters



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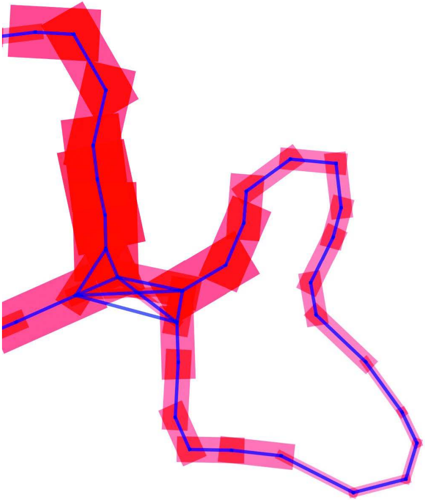
Path segments

Between each waypoint is a path segment

The measurement use for determining bot is:

$$\frac{\text{\# of path segments traversed}}{\text{Distinct path segments}}$$

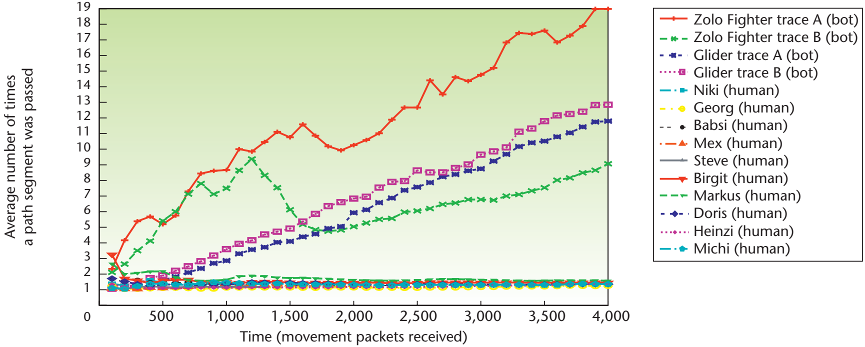


http://tinyurl.com/nfedb8x

Performance evaluation

- World of Warcraft Private Server
- Ten players, beginners to experience players
- Two bot program: ZoloFighter Bot and Glider Bot
- Four hour long movement, a total of 14 movements

Results



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Threshold for average path segment set at 5

The algorithm was able to detect the four bots fairly quick

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Party Play Overview

Action analysis approach

Focuses on bots that party up to do repetitive tasks

Algorithm takes the following steps:

1. Find potential bots from party logs
2. Find significant actions between players and bots
3. Construct a rule-base from the significant actions

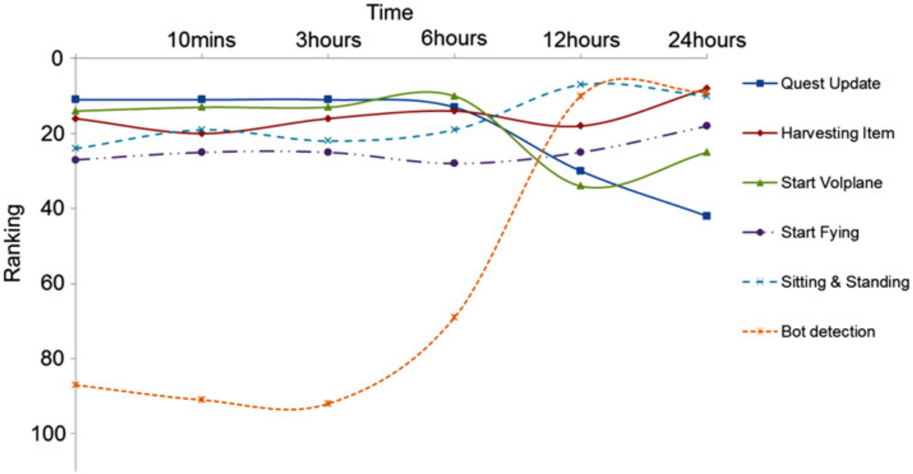
Two assumptions are used to find bots from party logs

They analyzed the MMOG called Aion from NCsoft Inc.

1. Bot parties last longer than normal parties
2. Bot parties consist of two; one that gathers and one that fights monsters
    - having too many bots may become inefficient
    - it is difficult for one bot to gather resources and fight monsters

From the party logs: split players and bots and compare the actions between these two

Significant actions that may be use for classifying bots



http://tinyurl.com/pxu8z7s

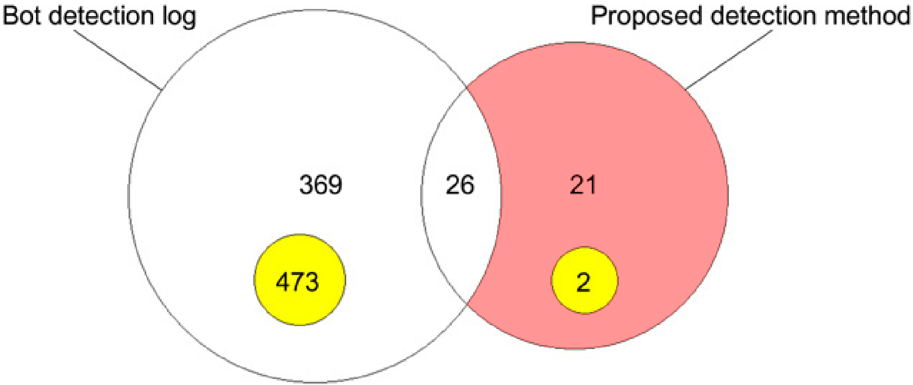
Create rule-base

Rules
Getting experience log >= 34%
Getting race point log <= 1.69%
Standing and sitting log <= top 10 rank
Using item log <= 1.19%
Quest completion log <= 0.16%
Start volplane log >= top 34 rank
Party member = 2 and party duration >= 600 seconds

Performance evaluation

- MMOG Aion developed by NCSoft Incorporation
- Seven days worth of party logs
- 63,092 parties were extracted
- Applied rule-base to 52,377 players from the party logs

Results



□ Detected by NCSoft's internal tool

🟥 Detected by the algorithm

🟨 Not ban from the game

Modified from `http://tinyurl.com/pxu8z7s`

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Conclusions

- Waypoint with Path Segments can be use to detect repetitive movements
- Party analysis can be use to detect bots that party up
- Bot actions and movements different from players
- Server-side detectors are efficient and has the potential to be use in a real game environment

Thank you for your time!

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Questions?

References

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