



Deposited via The University of Leeds.

White Rose Research Online URL for this paper:

<https://eprints.whiterose.ac.uk/id/eprint/89097/>

Version: Accepted Version

Proceedings Paper:

Müller, S, Kapadia, M, Frey, S et al. (2015) HeapCraft Social Tools: Understanding and Improving Player Collaboration in Minecraft. In: Proceedings of the 10th International Conference on the Foundations of Digital Games (FDG 2015). Foundations of Digital Games 2015, 22-25 Jun 2015, Pacific Grove, CA, USA. ISBN: 978-0-9913982-4-9.

Reuse

Items deposited in White Rose Research Online are protected by copyright, with all rights reserved unless indicated otherwise. They may be downloaded and/or printed for private study, or other acts as permitted by national copyright laws. The publisher or other rights holders may allow further reproduction and re-use of the full text version. This is indicated by the licence information on the White Rose Research Online record for the item.

Takedown

If you consider content in White Rose Research Online to be in breach of UK law, please notify us by emailing eprints@whiterose.ac.uk including the URL of the record and the reason for the withdrawal request.

HeapCraft Social Tools

Understanding and Improving Player Collaboration in Minecraft

Stephan Müller*
ETH Zürich

Mubbasir Kapadia
Disney Research Zürich and
Rutgers University

Seth Frey
Disney Research Zürich

Severin Klingler
ETH Zürich

Richard P. Mann
ETH Zürich

Barbara Solenthaler
ETH Zürich

Robert W. Sumner
Disney Research Zürich and
ETH Zürich

Markus Gross
Disney Research Zürich and
ETH Zürich

ABSTRACT

We introduce a framework to influence and analyze player collaboration in Minecraft. The framework consists of a telemetry system and several tools to influence player behavior and provide value to server administrators to increase adoption. The data collection includes almost every aspect of gameplay and can be used for analysis beyond player collaboration.¹ We started collecting data from several Minecraft servers in March 2015. Most data will be made available to researchers upon request.² We have also demonstrated the use of our framework to statistically analyze player behavior in Minecraft. More details can be found [1].

1. COMPONENTS

Epilog. The Epilog plugin allows server administrators to send player data to our data collection server. The plugin keeps server performance impact to a minimum and sends data over an encrypted connection. Epilog records almost all player related game events, including player movement, block placement, mining and inventory content. The logging of chat messages can be disabled.

Epilog Dashboard. The Epilog Dashboard is a web-based frontend which provides insight into the collected data to Minecraft server administrators. Available datasets include heat maps of player positions and player properties like number of placed blocks, duration of active gameplay or time spent near other players. The datasets are updated by the

*contact@heapcraft.net

¹The framework is part of the HeapCraft project which aims to explore the scientific potential of Minecraft.

²Contact us on <http://heapcraft.net/>

Most Active Players						all players
Name	Last active	Active for	Traveled	Mined	Placed	Social
[redacted]	209d 22h	1d 16h	139,052	27,595	7,446	0.037
[redacted]	182d 9h	1d 12h	211,851	41,762	15,857	0.035
[redacted]	228d 4h	1d 0h	191,096	18,696	12,701	0.093
[redacted]	84d 20h	23h 41m	186,811	15,448	7,349	0.304
[redacted]	134d 23h	22h 3m	217,126	11,140	5,558	0.193
[redacted]	232d 2h	16h 27m	93,127	13,926	9,882	0.057
[redacted]	164d 22h	16h 25m	123,052	10,267	6,246	0.333
[redacted]	228d 3h	16h 4m	109,793	8,816	5,794	0.138
[redacted]	231d 1h	16h 3m	100,770	11,200	7,117	0.170
[redacted]	161d 23h	15h 46m	101,716	9,369	5,222	0.401

Figure 1: One of the datasets available to server administrators over the Epilog Dashboard. The units for traveled, mined and placed are blocks; social is (time active near other players)/(time active).

Epilog backend as soon as new data is available.³ This enables observing player activity in real time.

DiviningRod. The DiviningRod plugin adds programmable compasses to Minecraft. They can point to players, specific locations or to player-created signs containing hashtags. A demonstration of the plugin is available on YouTube.⁴

The Epilog backend provides DiviningRod with dynamically created player classes based on behavioral analysis. This enables players to find other players with certain properties, e.g. players who spend a lot of time near other players or players who are new to the server. We use DiviningRod to evaluate whether a navigation tool can improve player collaboration. DiviningRod sends detailed usage information to our data collection server over Epilog. Classes of other players and additional compass targets can be set remotely for each individual player.

³Epilog sends data updates every 20 seconds by default.

⁴<https://youtu.be/jHYTNrYQNRO>



Figure 2: Diviningrod displaying the distance to a sign.

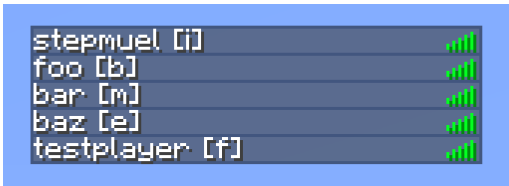


Figure 3: The player list annotated with idle, build, mine, explore and fight by Classify.

Classify. The Classify plugin annotates the in-game list of online players with their current behavior. Available options are: build, mine, fight, explore and idle. The classifier is based on the work of our previous paper [1] and uses data collected by the Epilog plugin.

Data Exploration Tools. We built interactive data visualization tools to help us explore the collected datasets. Fig. 4 shows a weighted graph of player relations. Fig. 5 shows a visualization of spatial information over a selected period of time.

2. ADOPTION AND PARTICIPATION

In order to collect enough data for our study on player collaboration, we need as many participating Minecraft servers as possible. While some administrators installed our plugins just to support our research, most participants did so because of the value they provide to them. Classify and the Epilog Dashboard have been created especially for that purpose. DiviningRod includes many features not directly related to collaboration to make it more useful as a universal game aid.

We are actively collecting data for our research on collaboration and will keep collecting data for future studies. If you run a Minecraft server and want to support us, you can find the Epilog and DiviningRod plugin on our website.⁵

Acknowledgements

Richard P. Mann was supported by ERC Advanced Investigator grant 'Momentum' no. 324247 to Dirk Helbing. Credit

⁵<http://heapcraft.net/>.



Figure 4: Players working to the same buildings. Weighted by amount of contributed blocks.

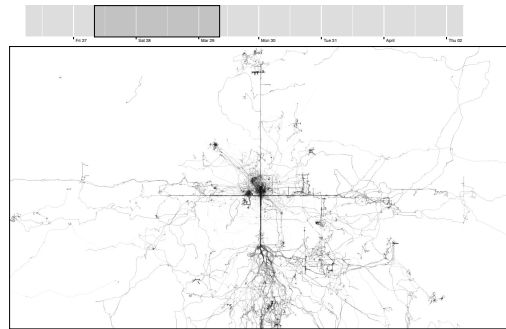


Figure 5: Player positions accumulated over two days.

for all screenshots from Minecraft go to Minecraft © TM & © 2009-2015 Mojang / Notch. This work was partially supported by ETH Research Grant ETH-23 13-2.

3. REFERENCES

- [1] Müller, Kapadia, Frey, Klingler, Mann, Solenthaler, Sumner, and Gross. Statistical analysis of player behavior in minecraft. In *Proceedings of the 10th International Conference on Foundations of Digital Games*, FDG '15, To Appear.