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HeapCraft Social Tools
Understanding and Improving Player Collaboration in Minecraft

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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. We started collecting data from several Minecraft servers in March 2015. Most data will be made available to researchers upon request. 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 Epilog backend as soon as new data is available. 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. 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.

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).

<table>
<thead>
<tr>
<th>Most Active Players</th>
<th>all players</th>
</tr>
</thead>
<tbody>
<tr>
<td>Name</td>
<td>Last active</td>
</tr>
<tr>
<td>[redacted]</td>
<td>20:00 2h</td>
</tr>
<tr>
<td>[redacted]</td>
<td>18:00 0h</td>
</tr>
<tr>
<td>[redacted]</td>
<td>22:00 4h</td>
</tr>
<tr>
<td>[redacted]</td>
<td>22:00 12h</td>
</tr>
<tr>
<td>[redacted]</td>
<td>13:00 2h</td>
</tr>
<tr>
<td>[redacted]</td>
<td>23:00 2h</td>
</tr>
<tr>
<td>[redacted]</td>
<td>16:00 2h</td>
</tr>
<tr>
<td>[redacted]</td>
<td>22:00 3h</td>
</tr>
<tr>
<td>[redacted]</td>
<td>21:16 1h</td>
</tr>
<tr>
<td>[redacted]</td>
<td>16:16 3h</td>
</tr>
</tbody>
</table>

∗ contact@heapcraft.net
1 The framework is part of the HeapCraft project which aims to explore the scientific potential of Minecraft.
2 Contact us on http://heapcraft.net/
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.

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3. REFERENCES