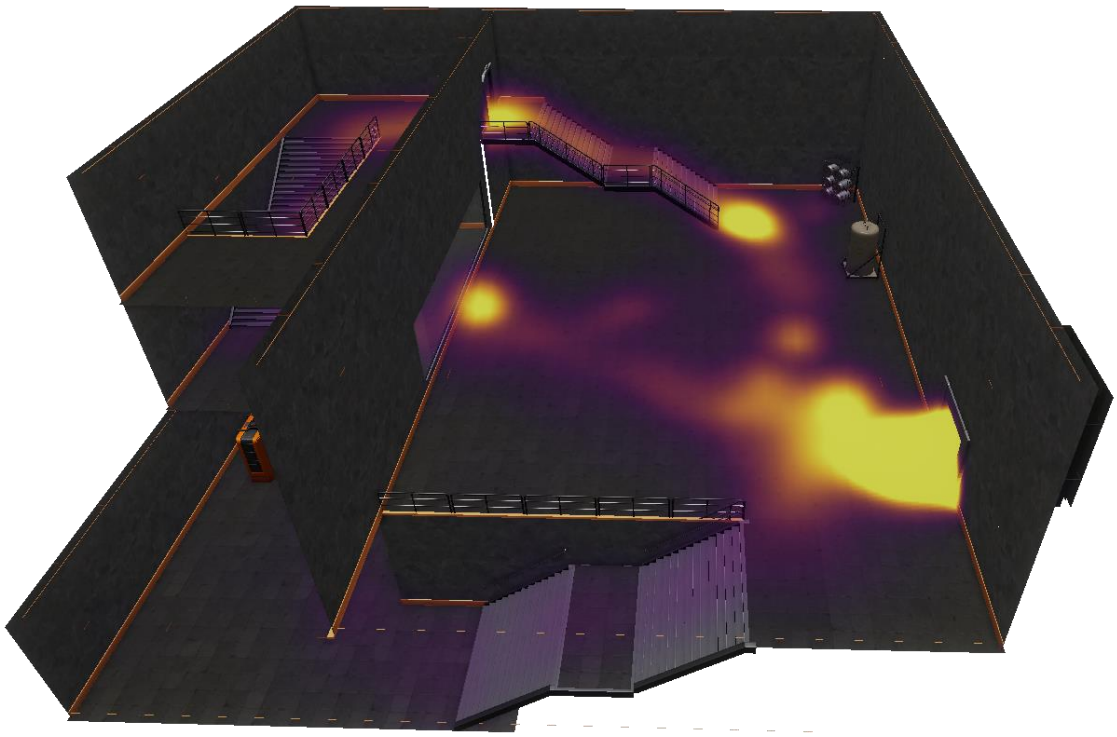
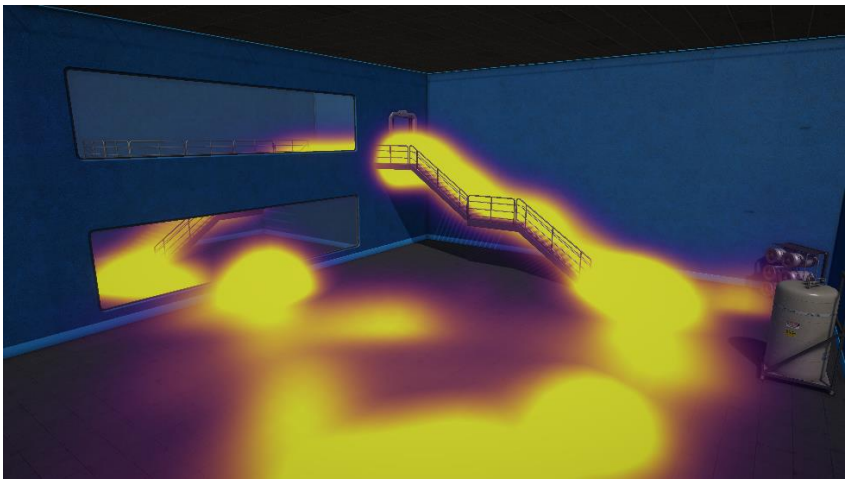
Volumetric Heatmap - Documentation





[Unity Asset Store Page]

Version: 1.2.0

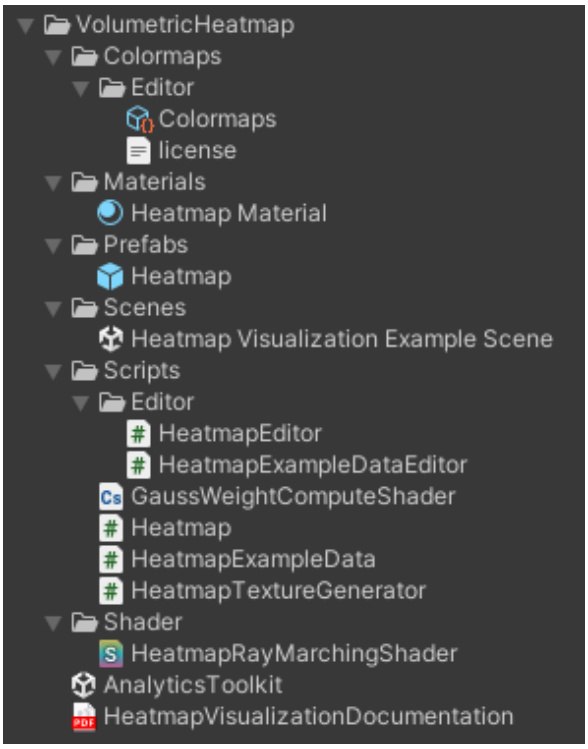
Contents

1. General Description

The *Volumetric Heatmap Package* can be used to analyze Data gathered from play testers, beta testers or just players. It works entirely in edit mode, so no need to enter play mode.

A System for analytics data collection is included. See ***Analytics Toolkit***.

2. Important Files



- `Prefabs/Heatmap.prefab`
  This is the main Prefab, use it to generate and show your heatmap.

- `Scripts/Heatmap.cs`
  This is the main component on the main prefab.

- `Scripts/HeatmapTextureGenerator.cs`
  In here is the class, which generates the `Texture3D` used for rendering the Heatmap.

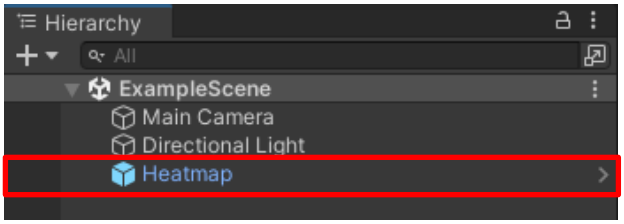
- `Scripts/Editor/HeatmapEditor.cs`
  The Editor Script for `Heatmap.cs`.

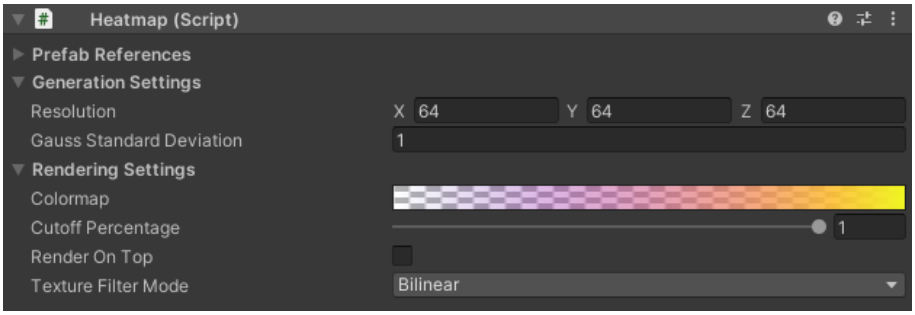
- `Colormaps/Editor/ Colormaps.gradients`
  This file holds some gradients you can use.

3. How To Use

3.1 Heatmap Prefab

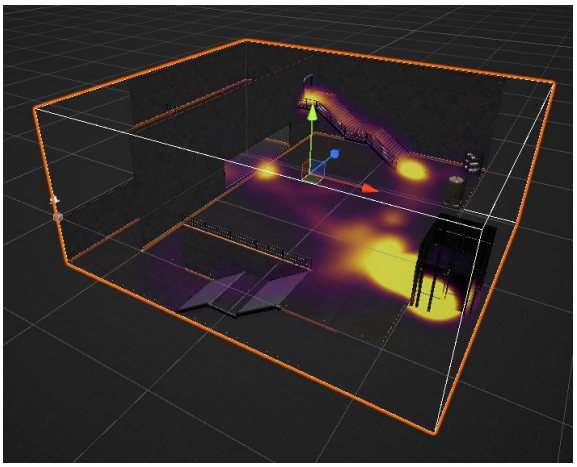
1.1 Place the heatmap prefab in your scene.



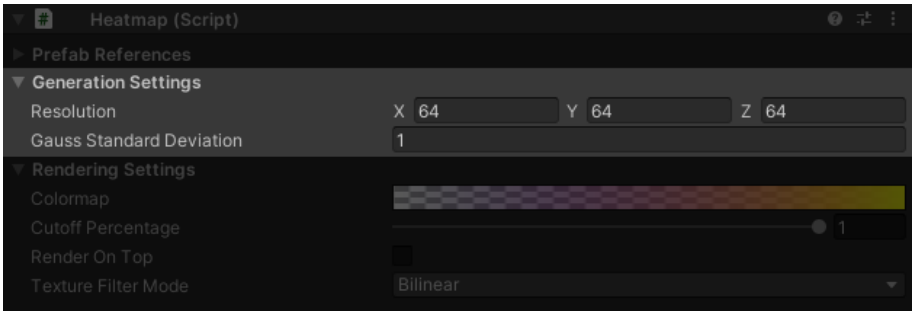


3.2 Heatmap Area

Adjust the **`position`** and **`scale`** of the prefabs transform, so it matches your map or world.
Important: Do not change its **`rotation`**.



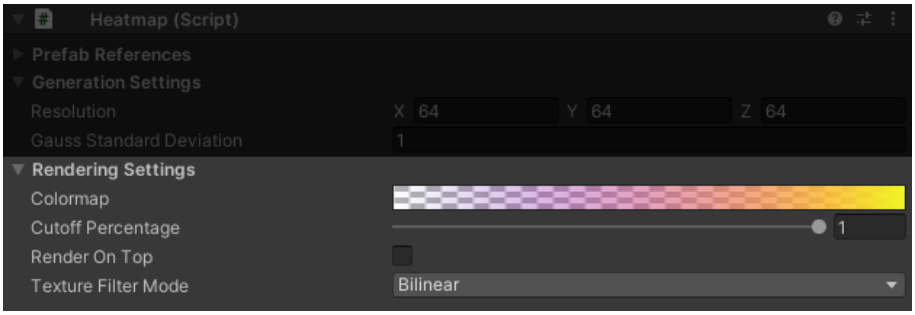
3.3 Heatmap Generation Settings



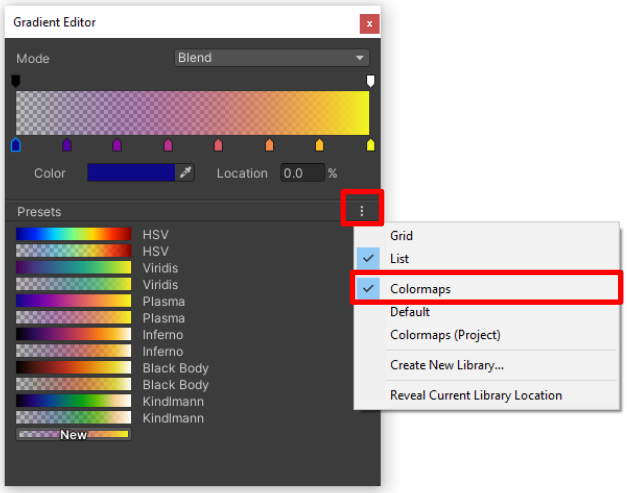
- **Resolution**
  The Resolution of the generated Texture3D. The Higher the Resolution the longer it takes to generate. On my System I can get it up to 512x512x512. I recommend starting with lower resolutions like 64x64x64 and increase from there.

- **Gauss Standard Deviation**
  The Influence range of each datapoint. The Influence is in the form of a normal distribution function.

3.4 Heatmap Rendering Settings



- **Colormap**
  The gradient used as colormap from cold to hot. Six different colormaps are included in the Package.



- **Cutoff Percentage**
  Set the maximum heat value as a percentage based on the highest value.
  Usually there is a lot of Datapoints at the Spawn point. This can prevent other areas from being visible at all. Therefore, you might need to set a threshold to cut off outliers.

- **Render On Top**
  If false, heat values behind another object will be ignored.

- **Texture Filter Mode**
  point, bilinear or trilinear

3.5 Generate Heatmap

Call the `GenerateHeatmap(points)` functions of the `Heatmap` component on the prefab in your scene. It only expects a List of points. Any points out of bounds will be ignored.

- `GenerateHeatmap(List<Vector3> points)`
- `GenerateHeatmap(Vector3[] points)`

The `HeatmapExampleData` Script can be used to generate heatmaps from random data points. Just put int on the same game object as the `Heatmap` component and press the generate Button.

If you have already precalculated density or heat data you can use the `GenerateHeatmapFromHeatValues(heatValues)` functions. The `heatValues` Array or List must contain one value for each voxel given by the resolution setting (x · y · z). The Order is x → y → z.

- `GenerateHeatmapFromHeatValues(List<float> heatValues)`
- `GenerateHeatmapFromHeatValues(float[] heatValues)`

4. Performance and Restrictions

The Cost of the heatmap generation is dependent on the texture resolution and the data point count. I was able to generate heatmaps up to 256x256x256 and 1 000 000 data points in about a second. This can be achieved due to a compute shader taking over the most expensive part of the pipeline. On higher resolutions, the compute shader might reach the graphic driver's timeout (the timeout can be changed in a setting usually).

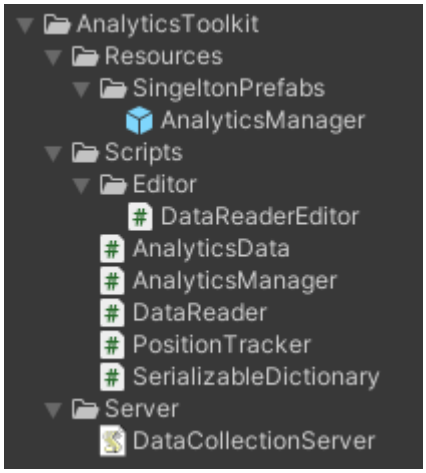
5. Colormaps

More Information about the used colormaps can be read on this post:
https://www.kennethmoreland.com/color-advice/

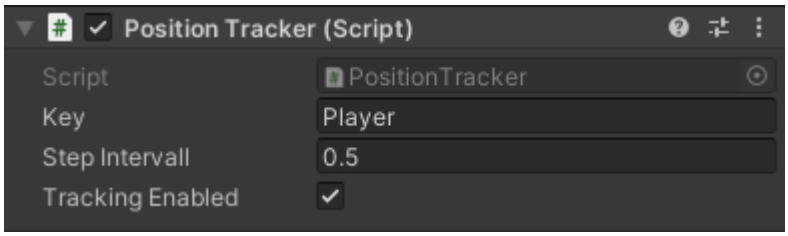
6. Analytics Toolkit

A System for data collection is included. But since it may be dependent on the specifications of your project, there may be changes necessary.

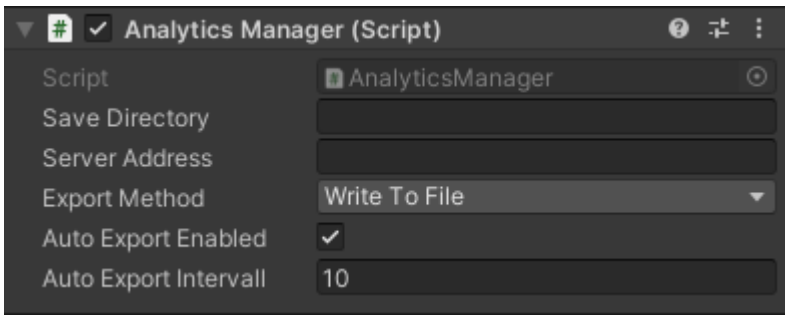
It is provided within the `AnalyticsToolkit.unitypackage`, which can be extracted into the Assets folder.



1. **Prepare the Game**
   The `PositionTracker` component can be set up to automatically track its game object's position. To allow multiple instances, it requires you to give it a `string Key`.

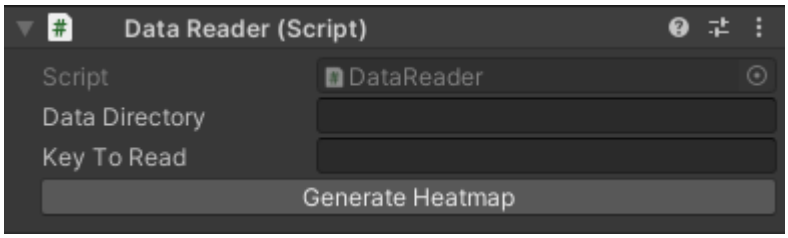


   It uses the `AnalyticsManager`, which will instantiate itself from the Resources folder. On the `AnalyticsManager` Prefab in `Resources/SingeltonPrefabs` you can choose how to export the collected data. It can either write it to the local file system or send it to a server by `HTTP Post`. Depending on your choice, you need to fill in the local `Save Directory` or the `Server Address`. The Data will be exported in fixed intervals if auto export is enabled. Otherwise, you can still call the public `ExportData` function.



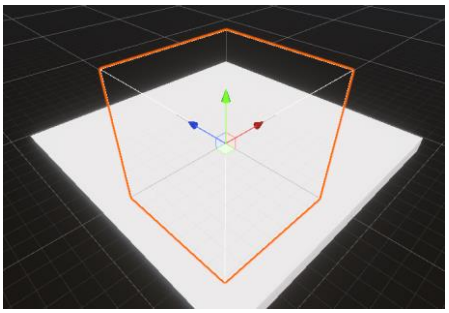
2. **Set up the Server**
   This step is only required when the server option is selected.
   The toolkit includes a simple Node.js server script. It dumps all the payload of *https Post* Requests into a File named by the current timestamp. After setting up the server, the address must be assigned to the `AnalyticsManager` Prefab.

3. **Generate the Heatmap**
   The `DataReader` component can be used in the same fashion as the `HeatmapExampleData` component. Put int on the same game object as the `Heatmap` component and set the path to the folder containing the analytics data files. Then you can press the generate Button. Then you only need to choose which path tracker's path you want to visualize by its key.

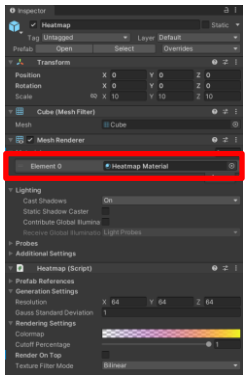


7. Troubleshooting

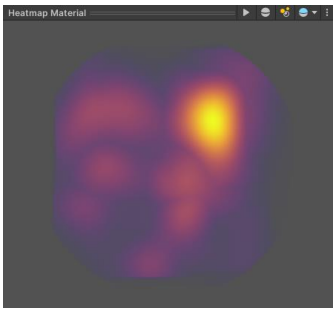
7.1 Not Showing Anything



Inspect the material of the mesh renderer of the *heatmap* game object.

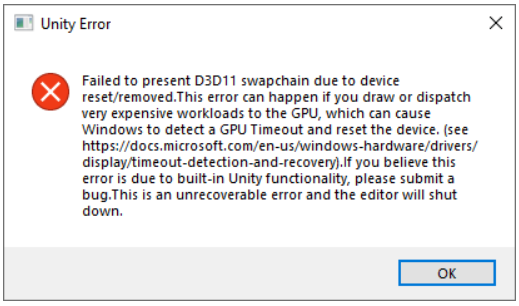


If it shows properly in the material preview (while selecting the game object), it might be due to a Problem with the Depth Buffer.



If the depth buffer can't be used in your project, there might be problems when enabling *Render On Top* in the *Heatmap Rendering Settings*. You should try to disable it.

7.2 Compute Shader Timeout



When getting this error on generating the heatmap, this might be due to the graphics drivers compute shader timeout. You should try a lower *Resolution* in the *Heatmap Rendering Settings*.

If you really need the high resolution, there might be ways to increase the compute shader timeout on your system.