Visualising Virtual Observatory Data in Digital Planetaria

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Introduction

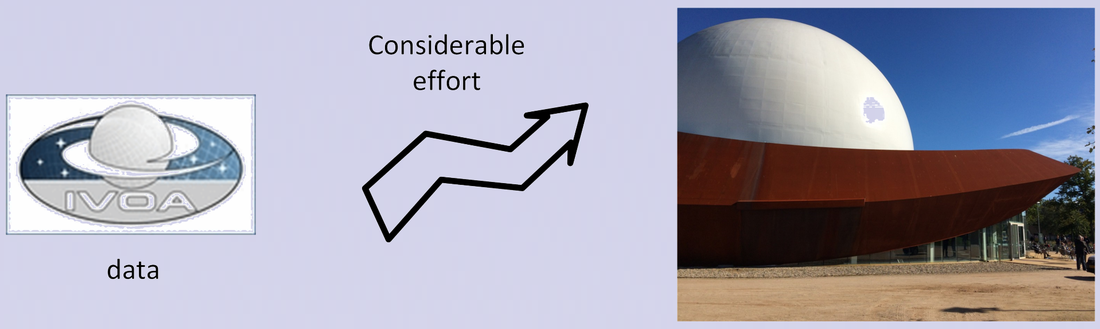


Figure 1: *The Virtual Observatory provides a rich source of material for preparing presentations for the general public in digital planetaria. However, the effort required in preparing the data for display in most planetaria is considerable.*

The most common software used in domes today (e.g. SkySkan and Digistar) cannot read data from standard astronomical formats.

Proposed pipeline

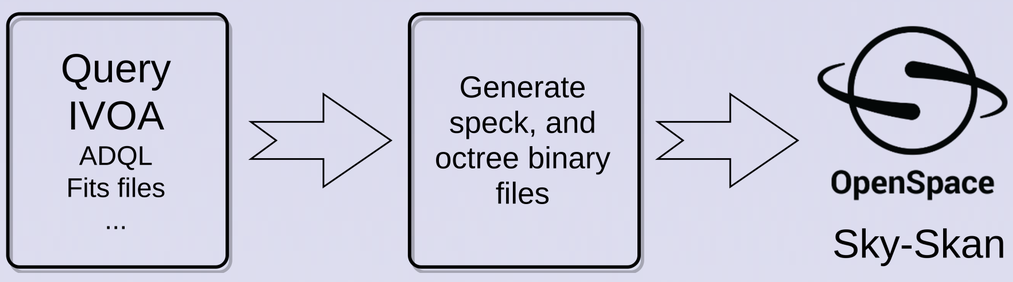
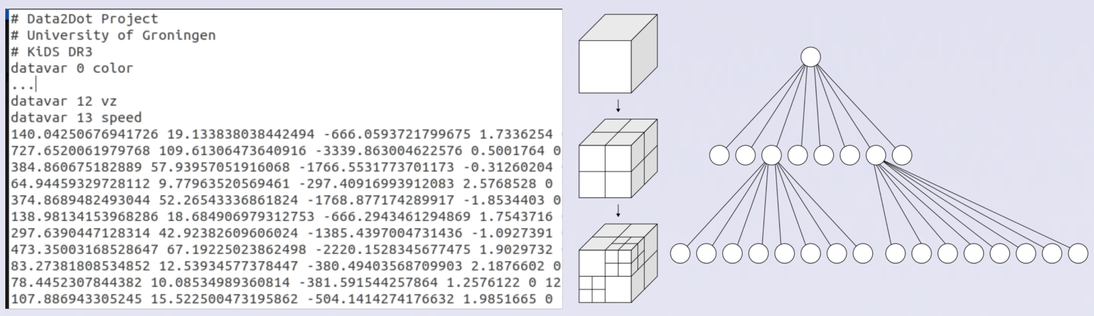


Figure 2: *Proposed pipeline to enable the extraction of catalogue data from the Virtual Observatory and its conversion into formats which can be used by planetaria software systems.*

Main File Formats



```
# Data2Dot Project
# University of Groningen
# KiDS DR3
datavar 0 color
...
datavar 12 vz
datavar 13 speed
140.04250676941726 19.133838038442494 -666.0593721799675 1.7336254
727.6520061979768 109.61306473640916 -3339.863004622576 0.5001764 0
384.860675182889 57.93957051916068 -1766.5531773701173 -0.31260204
64.94459329728112 9.77963520569461 -297.40916993912083 2.5768528 0
374.8689482493044 52.26543336861824 -1768.877174289917 -1.8534403 0
138.98134153968286 18.684906979312753 -666.2943461294869 1.7543716
297.6390447128314 42.92382609606024 -1385.4397004731436 -1.0927391
473.35003168528647 67.19225023862498 -2220.1528345677475 1.9029732
83.27381808534852 12.539345777378447 -380.49403568709903 2.1876602 0
78.4452307844382 10.08534989360814 -381.591544257864 1.2576122 0 12
107.886943305245 15.522500473195862 -504.1414274176632 1.9851665 0
```

Figure 3: LEFT: *.speck (txt) file.* RIGHT: *octree struture used to store astronomical data as binary files.*

Perhaps the most common file structure used by planetaria software systems is the speck file. However, octree binary files offer several advantages over speck files such as: faster loading and no need to fit the whole data into memory, as octree nodes can be loaded or removed from memory as needed.

Contact

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OpenSpace Visualizations

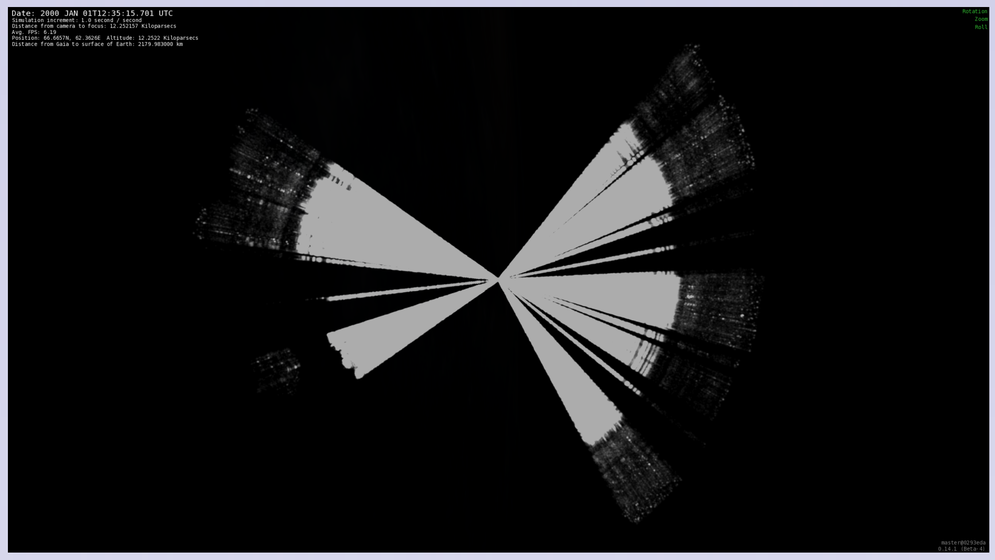

Figure 4: *Visualization of about 48 million objects from KiDS Data Release 3. Data was extracted from FITS tables, then 3D coordinates were estimated, stored as octree binary files and then the objects were visualized using OpenSpace.*

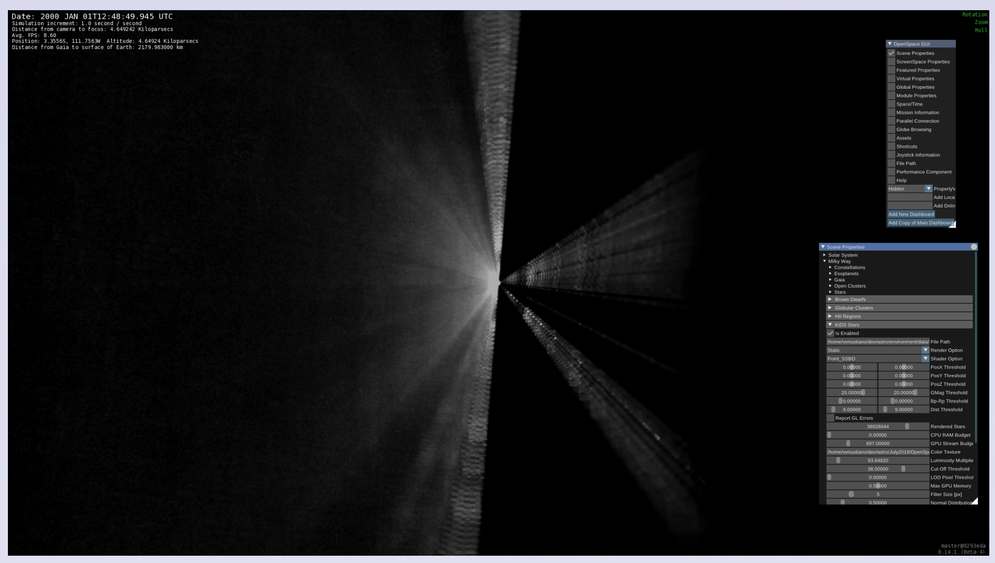

Figure 5: *A lateral view of the KiDS data.*

Figure 6: *Globular cluster of M4 or Messier 4 (NGC6121) which has about 30,000 stars. When seen telescopically, it features a characteristic "bar" structure across the space.*

Conclusions and future work

The ultimate realeases of data as collected from astronomical devices are available for the general public. Tools and techniques to visualize the data in digital planetaria are available as well. However, preparing the data for such visualizations is still time consuming. Here, we present a possible pathway to accelerate this process. In the near future we plan to develop a graphical user interface to facilitate data preparation for digital planetaria.