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UNIVERSITÄT DUISBURG ESSEN

Offen im Denken

Exercise Sheet 5

Information and Software Visualization (SoSe 2019)

Deadline: Wednesday, 22.05.2019, 14:00

Everyone is required to submit an individual solution. Group discussions are possible and encouraged, but each individual solution must be clearly distinguishable from others. The submission takes place via Moodle—upload your solution as an index.html file. Make sure your code runs in the current version of Google Chrome.

This exercise sheet includes 2 task with a total of 10 Points (10 Point $\widehat{=}$ 100%).

Task 1 *[Points: 10]*

Research is often published in the form of research papers. Every research paper is usually tagged with *keywords*—the research topics presented in the paper. You are provided a list of articles that have been tagged, i.e., every publication is assigned a set of *keywords* and is provided as a bib file. An entry of this bib file is shown below:

```
var bib = {
"AnthesGarcia-HernandezEtAl2016": {
"author": "C. Anthes and R. J. Garcia-Hernandez and M. Wiedemann and D. Kranzlmuller",
"booktitle": "2016 IEEE Aerospace Conference",
"doi": "10.1109/AERO.2016.7500674",
"file": "AnthesGarcia-HernandezEtAl2016.pdf:AnthesGarcia-HernandezEtAl2016.pdf:PDF",
"keywords": "virtual reality, survey, aerospace",
"month": "March",
"pages": "1-19",
"title": "State of the art of virtual reality technology",
"type": "InProceedings",
"year": "2016"
},
...
}
```

To ease the implementation, we have provided a template which has the bibliographic data stored in the `bib` variable. Develop an interactive graph visualization with *D3js* according to the following subtasks:

(a) *(6 Points)* **Basic Visualization:** Create the following graph.

- **Nodes:** The various keywords form the nodes of the graph.
- **Edges:** An edge between two nodes (representing keywords) exist, if there is at least one publication with both keywords.
- **Edge Weight:** The edge weight of an edge between two nodes (representing keywords) is determined by the number of publications with both the keywords.

Use the default force-based layout to render the graph. Encode the number of publications associated with a keyword in the size of the node. Make sure that each node does not fall below a certain minimum size (so that it remains clickable) as well as not too large (so that the node does not occlude other nodes). Also, display a legend showing the node size encoding.

(b) *(4 Points)* **Interaction:** Implement a click interaction for the nodes. Clicking on any node should display a list of the publications associated with the node (keyword). Also, highlight the currently selected node in the graph visualization. To display the publication list, use the

gray area right to the visualization in the template. For each publication, show the authors, the title, and the publication year. In addition, display the selected keyword and the number of associated publications on top of the list of publication. The selection changes when clicking on another node.

Task 2 (Bonus) *[Points: 5]*

Improved Graph Layout: To improve readability of the visualization, simplification of the graph is important. Please simplify the graph layout based on the following criteria:

- **Nodes:** Limit the number of visualized nodes to the keywords that appear in at least three publications.
- **Edges:** Filter the edges based on

$$w(a,b) = \frac{|A \cap B|}{\min(|A|, |B|)}$$

for each edge (a, b), where $w(a, b)$ denotes the edge weight and A denotes the set of keywords associated with node a (analogously: set of keywords B for node b). Show only those edges (a, b) for which $w(a, b) \geq 0.5$.