Visualizing Sets and Set-typed Data: State-of-the-Art and Future Challenges (Supplementary Material)

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Abstract

In this document, we provide supplementary material to our report. This includes: a list of the reviewed conference proceedings and journals to conduct the survey; links to available software implementations, demonstrations, presentations and any other additional material about set visualization; a list of theses on set visualizations. Further resources are available on the survey website \url{http://www.setviz.net}.

1. Covered Literature

The following conference proceedings and journals have been reviewed to conduct our survey:

<table>
<thead>
<tr>
<th>Short name</th>
<th>Full name</th>
<th>Years</th>
</tr>
</thead>
<tbody>
<tr>
<td>CGF</td>
<td>Computer Graphics Forum (published by Eurographics)</td>
<td>1982-2013</td>
</tr>
<tr>
<td>Diagrams</td>
<td>International Conference on Diagrammatic Representation and Inference</td>
<td>2000-2012</td>
</tr>
<tr>
<td>-</td>
<td>International Workshop on Euler Diagrams</td>
<td>2005-2012</td>
</tr>
<tr>
<td>EuroVis</td>
<td>Joint Eurographics-IEEE Symposium on Visualization (Conferene since 2012)</td>
<td>1999-2013</td>
</tr>
<tr>
<td>GD</td>
<td>Symposium on Graph Drawing</td>
<td>1994-2013</td>
</tr>
<tr>
<td>InfoVis</td>
<td>IEEE Symposium on Information Visualization (Conferene since 2006)</td>
<td>1995-2013</td>
</tr>
<tr>
<td>IV</td>
<td>International Conference Information Visualisation</td>
<td>1997-2013</td>
</tr>
<tr>
<td>IVS</td>
<td>Information Visualization (published by SAGE)</td>
<td>2006-2013</td>
</tr>
<tr>
<td>JVLC</td>
<td>Journal of Visual Languages and Computing</td>
<td>1990-2013</td>
</tr>
<tr>
<td>PacificVis</td>
<td>Asia Pacific Symposium on Information Visualisation</td>
<td>2005-2013</td>
</tr>
<tr>
<td>VAST</td>
<td>IEEE Conference on Visual Analytics Science and Technology</td>
<td>2006-2013</td>
</tr>
<tr>
<td>VL/HCC</td>
<td>IEEE Symposium on Visual Languages and Human-Centric Computing</td>
<td>2004-2013</td>
</tr>
</tbody>
</table>
2. Resources of the Surveyed Techniques

We list available resources of the techniques discussed in the seven categories of our survey. This includes:

- software implementations,
- demonstrations,
- presentations, and
- other available material.

The techniques are shown in the same categories as in the survey. All links are last accessed in April 2014.

2.1. Euler and Venn Diagrams

2.1.1. Techniques for Any Set Relations

Diagrams Always Well-matched

- General Euler Diagram Generation (2008)
  Rodgers P, Zhang L, Fish A
  Publication: [RZF08]
  Website: http://www.eulerdiagrams.org/tutorial/EmbeddingTool.html
  Software: downloadable executable

- Inductively Generating Euler Diagrams (2011)
  Stapleton G, Rodgers P, Howse J, Zhang L
  Publication: [SRHZ11]
  Website: http://www.eulerdiagrams.org/inductive.htm
  Software: downloadable executable

Diagrams Not Always Well-matched – Uses Shading

- Drawing Euler Diagrams with Circles (2012)
  Stapleton G, Flower J, Rodgers P, Howse J
  Publication: [SFRH12]
  Website: http://www.eulerdiagrams.org/inductivecircles.html
  Software: downloadable executable

2.1.2. Techniques for Specific Set Relations

For Well-formed Diagrams with Circles

- Piercings Diagram Generation (2011)
  Stapleton G, Zhang L, Howse J, Rodgers P
  Publication: [SZHR11]
  Website: http://www.eulerdiagrams.org/piercing.htm
  Software: downloadable executable

For Well-formed Diagrams with Polygons

- Generating Euler Diagrams (2002)
  Flower J, Howse J
  Publication: [FH02]
  Software: in Java, not online

- Embedding Wellformed Euler diagrams (2008)
  Rodgers P, Zhang L, Stapleton G, Fish A
  Publication: [RZSF08]
  Website: http://www.eulerdiagrams.org/IV.htm
  Software: downloadable executable

Using Existing Layouts

- Euler Diagrams from Existing Layouts (2008)
  Stapleton G, Howse J, Rodgers P, Zhang L
  Publication: [SHRZ08]
  Software: in Java, not online

Layout Improvement

  Flower J, Rodgers P, Matton P
  Publication: [FRM03]

- eulerForce (2009)
  Micallef L, Rodgers P
  Publication: [MR09]
  Website: http://www.eulerdiagrams.org/eulerForce
  Software: open-source (GPLv3, Java) + downloadable executable

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2.1.3. Techniques for Area-Proportional Diagrams

Using Circles

3 Circle Venn Applet (2005)
Chow S, Rodgers P
Publication: [CR05a]
Website: http://www.cs.kent.ac.uk/people/staff/pjr/EulerVennCircles/EulerVennApplet.html
Software: Java applet

Venn Diagram Plotter (2004-2013)
Littlefield K, Monroe M
Publication: [Wil12]
Website: http://www.cs.kent.ac.uk/people/staff/pjr/EulerVennCircles/EulerVennApplet.html
Software: open-source (ALv2) + downloadable executable

venneuler (2012)
Wilkinson L
Publication: [Wil12]
Website: http://www.cs.kent.ac.uk/people/staff/pjr/EulerVennCircles/EulerVennApplet.html
Software: open-source (MPL, Java) + R function as a CRAN package + a Cytoscape plugin

Using Ellipses

eulerAPE (2012)
Micallef L, Rodgers P
Publication: [MR12]
Website: http://www.eulerdiagrams.org/eulerAPE
Software: open-source (GPLv3, Java) + downloadable executable
Presentation: GHC 2012 and ACM SRC 2012 poster http://kar.kent.ac.uk/30855

Using Polygons

DrawVenn (2003)
Chow S, Ruskey F
Publication: [CR03]
Website: http://theory.cs.uvic.ca/euler/DrawVenn/
Software: Java applet

Convex Venn-3 (2010)
Rodgers P, Flower J, Stapleton G, Howse J
Publication: [RFSH10]
Website: http://www.cs.kent.ac.uk/people/staff/pjr/ConvexVenn3/diagrams2010.html
Software: Java applet

DrawEuler (2005)
Chow S, Ruskey F
Publication: [CR05b]
Website: http://theory.cs.uvic.ca/venn/DrawEuler
Software: Java applet

VennMaster (2005, 2008)
Publications: [KMGB05, KMK*08]
Website: http://sysbio.uni-ulm.de/?Software:VennMaster
Software: open-source (GitHub, Java) + downloadable executable

Using Circles, Convex and Non-convex Polygons

Euler3 Applet (2014)
Rodgers P, Howse J, Stapleton G, Flower J
Publication: [RHSF14]
Website: http://www.eulerdiagrams.com/Euler3.html
Software: Java applet

2.1.4. Techniques for Euler Diagrams with Glyphs

eulerGlyphs (2012)
Micallef L, Dragicevic P, Fekete J -D
Publication: [MDF12]
Software: open-source (GPLv3, Java) + downloadable executable
Demonstration: http://www.youtube.com/watch?v=D8V2qxcuQIO
Presentation: InfoVis 2012 talk www.cs.kent.ac.uk/people/staff/lm357/AssessingVisForBayesianReasoning_InfoVis2012-pres.pptx
2.2. Euler Diagram Variants

Fan Diagrams (2007)
Kim B, Bongshin L, Seo J
Publication: [KLS07]
Website: http://hcil.snu.ac.kr/research/conset
Software: downloadable executable
Presentation: InfoVis 2006
poster http://www.dropbox.com/s/vxrg01lqgqa3w39/ConSetInfoVisPoster.pdf

Missing Pieces (2006)
InfoSpace, Inc
Publication: [KSJ*06]
Software: not online

Untangled Euler Diagrams (2010)
Riche N H, Dwyer T
Publication: [HRD10]
Software: not online
Demonstration: http://www.youtube.com/watch?v=q2tUrqiFHBc
Presentation: InfoVis 2010 talk http://vimeo.com/groups/210231/videos/76068208

2.3. Overlays

2.3.1. Region-based Overlay Techniques

BubbleSets (2009)
Collins C, Penn G, Carpendale S
Publication: [CPC09]
Website: vialab.science.uoit.ca/research
Software: open source executable (Java)
Demonstration: demonstrating interaction http://www.youtube.com/watch?v=Ju2hSThmPWA

Vizster (2005)
Heer J, Boyd D
Publication: [HB05]
Website: http://vis.stanford.edu/jheer/projects/vizster/
Software: open source executable (Java)
Demonstration: demonstrating interaction http://www.youtube.com/watch?v=Ju2hSThmPWA

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2.3.2. Line-based Overlay Techniques

LineSets (2011)
Alper B, Henry-Riche N, Ramos G, Czerwinski M

Publication: [CPC09]
Software: in C# (contact authors)
Demonstration: demonstrating interaction
http://ieeexplore.ieee.org/xpl/abstractMultimedia.jsp?arnumber=6064991&tag=1

Kelp Diagrams (2012)
Dinkla K, Van Kreveld M, Speckmann B

Publication: [DvKSW12]
Presentation: EuroVis 2012 slides
http://www.dropbox.com/s/3fculfyu4398mv7/presentation.pptx

KelpFusion (2013)
Meulemans W, Henry Riche N, Speckmann B, Alper B, Dwyer T

Publication: [MHRS∗13]
Demonstration: demonstrating interaction
Presentation: IEEE VIS 2013 slides

Parallel Tag Clouds (2011)
Collins C, Viegas F, Wattenberg M

Publication: [CVW09]
Website: http://vislab.science.uoit.ca/research
Demonstration: demonstrating interaction
http://www.youtube.com/watch?v=rL30a6x8qLw
Presentation: IEEE VAST 2009 slides available on the website.

Context-preserving Visual Links (2011)
Steinberger M, Waldner M, Streit M, Lex A, Schmalstieg D

Publication: [SWS∗11]
Software: open-source (Java)
http://github.com/Caleydo/visuallinks
Demonstration: http://www.youtube.com/watch?v=F2k4V8KG11I

2.3.3. Glyph-based Overlay Techniques

searchCrystal (2007)
Spoerri A

Publication: [Spo07]
Website: http://comminfo.rutgers.edu/~aspoerri/searchCrystal/
Software: Adobe Flash demo
http://comminfo.rutgers.edu/~aspoerri/searchCrystal/
Demonstration: demonstrating interaction
http://comminfo.rutgers.edu/~aspoerri/searchCrystal/
WikiEditWars_Screencast/
WikiEditWars_Screencast.html

2.4. Node-link Diagrams

Jigsaw (2007)
Stasko J, Geng C, Liu Z

Publication: [SGL08]
Website: www.cc.gatech.edu/gvu/ii/jigsaw/
Software: open source executable (Java)
Demonstration: List view in Jigsaw
http://www.cc.gatech.edu/gvu/ii/jigsaw/tutorial/listview/listview.html

PivotPaths (2012)
Dörk M, Henry Riche N, Ramos G, Dumais S

Publication: [DHRRD12]
Website: http://mariandoerk.de/pivotpaths/
Software: interactive web demo (JavaScript)
Demonstration: demonstrating interaction
http://www.youtube.com/watch?v=Md3ySGr5a1c

Circos (2009)
Krzywinski M

Publication: [KSB∗09]
Website: http://circos.ca
Software: open source (Perl)
D3 implementations of chord diagrams
http://d3js.org/
2.5. Matrix-based Techniques

**AquaVis** (2012)
Sadana R, Dove A, Stasko J

Publication: [SDS13]
Website: [http://www.cc.gatech.edu/gvu/ii/setvis/](http://www.cc.gatech.edu/gvu/ii/setvis/)
Software: interactive web demo (JavaScript)
Demonstration: system demonstration 
[http://www.cc.gatech.edu/gvu/ii/setvis/AquaViz.mov](http://www.cc.gatech.edu/gvu/ii/setvis/AquaViz.mov)

**ConSet** (2007)
Kim B, Bongshin L, Seo J

Publication: [KLS07]
Website: [http://hcil.snu.ac.kr/research/conset](http://hcil.snu.ac.kr/research/conset)
Software: downloadable executable
Presentation: InfoVis 2006 poster 
[http://www.dropbox.com/s/vyxg0ilgqma3w39/ConSetInfoVisPoster.pdf](http://www.dropbox.com/s/vyxg0ilgqma3w39/ConSetInfoVisPoster.pdf)

**eulerGlyphs** (2012)
Micallef L, Dragicevic P, Fekete J -D

Publication: [MDF12]
Software: open-source (GPLv3, Java) + downloadable executable
Demonstration: [http://www.youtube.com/watch?v=DBVZqxcu0I0](http://www.youtube.com/watch?v=DBVZqxcu0I0)
Presentation: InfoVis 2012 talk 

**Seto’ograms** (2008)
Freiler W, Matkovic K, Hauser H

Publication: [FMH08]
Website: [http://www.cg.tuwien.ac.at/research/publications/2008/freiler-2008-ste](http://www.cg.tuwien.ac.at/research/publications/2008/freiler-2008-ste)
Software: Open-source Java implementation (by Sean McKenna) 

**Parallel Sets** (2005)
Bendix F, Kosara R, Hauser H

Publication: [KBH06]
Website: [http://eagereyes.org/parallel-sets](http://eagereyes.org/parallel-sets)

**Radial Sets** (2013)
Alsallakh B, Aigner W, Miksch S, Hauser H

Publication: [AAMH13]
Website: [http://radialsets.org](http://radialsets.org)
Software: online Demos in Java and JavaScript
Presentation: available on the website

2.6. Aggregation-based Techniques

**Double-Decker Plot** (2000)
Hofmann H, Siebes A, Wilhelm A

Publication: [HSW00]
Software: open source (Java) [http://www.lifl.fr/~jourdan/download/arv.html](http://www.lifl.fr/~jourdan/download/arv.html)
R implementation (as part of the arulesViz package, which also produces mosaic displays) 
[http://cran.r-project.org/web/packages/arulesViz/index.html](http://cran.r-project.org/web/packages/arulesViz/index.html)

**Set'o’ograms** (2008)
Freiler W, Matkovic K, Hauser H

Publication: [FMH08]
Website: [http://www.cg.tuwien.ac.at/research/publications/2008/freiler-2008-ste](http://www.cg.tuwien.ac.at/research/publications/2008/freiler-2008-ste)
Software: Open-source Java implementation (by Sean McKenna) 

**Seto’ograms** (2008)
Freiler W, Matkovic K, Hauser H

Publication: [FMH08]
Website: [http://www.cg.tuwien.ac.at/research/publications/2008/freiler-2008-ste](http://www.cg.tuwien.ac.at/research/publications/2008/freiler-2008-ste)
Software: Open-source Java implementation (by Sean McKenna) 
3. Theses on Set Visualizations

Stirling Christopher Chow (2007). Generating and Drawing Area-Proportional Venn and Euler Diagrams, PhD thesis, Department of Computer Science, University of Victoria, Victoria, BC, Canada.


References


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