

Alexander Lex

Assistant Professor, SCI Institute
School of Computing, University of Utah
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Research Interest

Interactive data visualization, data analysis methods for scientists and experts,
visual analytics, visualization for biology, human computer interaction, data science.

Professional Appointments

University of Utah

Since 07/2015

Faculty Member at the Scientific Computing and Imaging Institute
Assistant Professor at the School of Computing

Harvard University

10/2012 – 05/2015

Post-Doctoral Fellow at the Visual Computing Group at the School of Engineering & Applied Sciences. Research on interactive analysis of heterogeneous and large data for scientists and experts.

Leading the visualization group, 07/2014 – 05/2015

Lecturer, teaching CS 171, Visualization, *01/2015 – 05/2015*

Graz University of Technology

03/2012 – 09/2012

Post-Doctoral Researcher. Senior researcher in the information visualization group. Co-leader of the Caleydo project. Research in visualization and HCI with a focus on molecular biology applications, such as pathway analysis, cancer subtype analysis, heterogeneous and multiple datasets.

Center for Biomedical Informatics at Harvard Medical School

08/2011 – 09/2011

Visiting Researcher. Designed and implemented visualization and interaction techniques for cancer subtype analysis.

Graz University of Technology

08/2010 – 09/2012

Lecturer (“Universitätsassistent”). Teaching courses on visualization, distributed systems, computer graphics. Student supervision.

Graz University of Technology

08/2008 – 03/2012

Research Assistant. Designed and developed the Caleydo Visualization framework. Focus on microarray data analysis and pathway visualization.

Education

Post-Doctoral Training

10/2012 – 05/2015

Harvard University
Mentor: Prof. Hanspeter Pfister

Doctoral Program in Computer Science

09/2008 – 03/2012

Graz University of Technology
Thesis: Visualization of Multidimensional Data with Applications in Molecular Biology
Advisor: Prof. Dieter Schmalstieg
graduated with highest distinction

Visiting PhD Student

08/2011 – 09/2011

Harvard Medical School
Advisors: Prof. Peter Park, Dr. Nils Gehlenborg

Master's Program ("Dipl.-Ing.") <i>Software Development and Business Management</i> Graz University of Technology graduated with highest distinction	09/2006 – 07/2008
Visiting Graduate Student McMaster University, Hamilton, ON, Canada	09/2006 – 05/2007
Bachelor's Program ("Bakk.rer.soc.oec") <i>Software Engineering and Knowledge Management</i> Graz University of Technology	09/2002 – 09/2006

Co-Authored Successful Project Grants

Visual Analysis of Genomic and Clinical Data from Large Patient Cohorts, PI: Peter Park, NIH U01 CA198935. Co-Investigator, Subcontract. 2015-2018

Integrative Pathway-Based Visualization of Heterogeneous Data, PI: Hanspeter Pfister, sponsored research agreement with Novartis Institutes for Biomedical Research. 2014-2016.

Diagnostics of Tumor Heterogeneity - a new Steering Factor for Colorectal Cancer?, PI: Gerald Höfler, funded by the state of Styria, Austria. 2012-2014.

CaleydoPLEX - Information Exploration in Teams, PI: Dieter Schmalstieg, funded by the Austrian Science Fund (FWF), Grant no. P22902. 2011-2014.

InGeneious - Visualization of biomolecular and clinical data, PI: Dieter Schmalstieg, funded by the Austrian Research Promotion Agency (FFG), BRIDGE program, Grant no. 385567. 2009.

Scholarships and other Personal Grants

Research grant: Visualizing Survey Data. Funded by the College of Nursing, University of Utah, 2016

Research grant: Visualizing Patient Referral Flow. Funded by the University Hospital, University of Utah, 2016.

Erwin Schrödinger Scholarship awarded by the Austrian Science Fund: *Visual Analysis of Heterogeneous Data using Semantic Subsets*. Funding two years at Harvard University and one-year return phase at Graz University of Technology. 2013-2016.

Scholarship for short time academic research and expert courses abroad (KUWI). Granted by the Graz University of Technology. 2011.

Research grant for students ("Förderstipendium") awarded by the Faculty of Computer Science, Graz University of Technology. 2007.

Joint Study scholarship for student exchange with McMaster University, Hamilton, On, Canada. 2006.

Honors and Awards

Honorable Mention Award (top 3 paper out of 183 submissions), EG/VGTC EuroVis, 2016.

Human Technology Interface Award for the work on cancer subtype visualization (StratomeX), awarded by the State of Styria, 2015.

Honorable Mention Award (top 3 paper out of 196 submissions), IEEE InfoVis, 2014.

Honorable Mention Award (top 5% paper, 3200 submissions), ACM CHI, 2014.

Best Paper Award (of 152 submissions), IEEE InfoVis, 2013.

Honorable Mention Award, IEEE BioVis Contest, 2013.

Excellence in Teaching Scholarship, funding a guest lecture at JKU Linz, awarded by the state of Upper Austria, 2013.

Best Dissertation Award by the “Forum Technology and Society”, Graz University of Technology, 2012.

Best Paper Award (of 32 submissions), IEEE BioVis, 2012.

3rd Best Paper Award (of 202 submissions), IEEE/EG EuroVis, 2012.

Best Paper Award (of 172 submissions), IEEE InfoVis, 2011.

Best Student Paper Award (of 88 submissions), ACM Graphics Interface, 2010.

Award for excellent performance as a student (“Leistungsstipendium”) granted by the Faculty of Computer Science, Graz University of Technology, 2007.

Teaching

CS-5963/Math-3900 — Introduction to Data Science, University of Utah, Fall 2016

Instructor. Undergraduate course on the fundamentals of data science. <http://datasciencecourse.net>

CS-5630/CS-6630 — Visualization, University of Utah, Fall 2015, 2016

Instructor. Hybrid graduate/undergraduate course on visualization covering fundamentals, information visualization and scientific visualization. <http://dataviscourse.net>

CS-7942 — Visualization Seminar, University of Utah, Fall 2016

CS 171 — Visualization, Harvard University, Spring 2015

Instructor. Undergraduate level lecture on visualization, visualization literacy, visualization critique, perception, data acquisition and cleanup, interaction. <http://cs171.org/2015/>

CS 171 — Visualization, Harvard University, 2013, 2014

Head teaching fellow. Instructor: Hanspeter Pfister.

Responsibilities: co-developed class, taught multiple lectures and supervised 15 teaching fellows.

BioVis — Visualization in Molecular Biology, Johannes Kepler University Linz, 2013

Instructor. Lecture series sponsored by an “Excellence in Teaching” scholarship, state of Upper Austria. Graduate lecture on visualization for molecular biology.

CS 109 / AC 209 / Stat 121 / E-109 — Data Science, Harvard University, 2013

Teaching fellow. Instructors: Hanspeter Pfister and Joe Blitzstein. Undergraduate and graduate lecture on data analysis using statistics, machine learning and visualization.

Selected Topics Computer Graphics, Graz University of Technology, 2010, 2011, 2012

Co-Instructor. Graduate level lectures on perception, color, information visualization, visual analytics, flow visualization.

Distributed Systems, Graz University of Technology, 2009, 2010, 2011

Teaching assistant. Undergraduate level. Development and supervision of lab assignments.

Introduction to Scientific Work, Graz University of Technology, 2010, 2011

Teaching assistant. Undergraduate level. Supervision of focus groups.

Computer Graphics 1, Graz University of Technology, 2011, 2012

Teaching assistant. Undergraduate level. Development and supervision of lab assignments.

Computer Graphics 2 Graz University of Technology, 2011, 2012

Teaching assistant. Undergraduate level. Development and supervision of lab assignments.

PhD Students

Carolina Nobre, 2016-2021

Asmaa Aljuhani, 2016-2021

Cameron Waller, 2016-2018, co-supervised with Jared Rutter

Christian Partl (TU Graz), 2013-2016, co-supervised with Dieter Schmalstieg

Other Mentored Students

Students at the University of Utah

Since 2015

I supervise or have supervised eight master's projects and two undergraduate's thesis.

Students at Harvard

2012 – 2015

I supervised four master's thesis at the Harvard Extension School and co-supervised one master's project, one undergraduate's final thesis, and one master's thesis at MIT.

Students at TU Graz

2008 – 2012

Co-supervised 17 student projects (bachelor's and master's thesis and projects).

See a full list of students at <http://alexander-lex.net/students.html>.

Peer-reviewed Publications

1. Christian Partl, Samuel Gratzl, Marc Streit, Anne Mai Wassermann, Hanspeter Pfister, Dieter Schmalstieg, and **Alexander Lex**, *Pathfinder: Visual Analysis of Paths in Graphs*. Computer Graphics Forum (EuroVis '16), vol. 35, no. 3, pp. 71-80, 2016. **Honorable Mention Award**.
2. Samuel Gratzl, **Alexander Lex**, Nils Gehlenborg, Nicola Cosgrove, and Marc Streit, *From Visual Exploration to Storytelling and Back Again*. Computer Graphics Forum (EuroVis '16), vol. 35, no. 3, pp. 491-500, 2016.
3. Hendrik Strobel, Bilal Alsallakh, Joseph Botros, Brant Peterson, Mark Borowsky, Hanspeter Pfister, and **Alexander Lex**, *Vials: Visualizing Alternative Splicing of Genes*. IEEE Transactions on Visualization and Computer Graphics (InfoVis '15), vol. 22, no. 1, pp. 399-408, 2016.
4. Carolina Nobre and **Alexander Lex**, *OceanPaths: Visualizing Multivariate Oceanography Data*. Proceedings of the Eurographics Conference on Visualization (EuroVis '15), Short Papers, 2015.
5. Marc Streit*, **Alexander Lex***, Samuel Gratzl, Christian Partl, Dieter Schmalstieg, Hanspeter Pfister, Peter J. Park, and Nils Gehlenborg, *Guided visual exploration of genomic stratifications in cancer*. Nature Methods, vol. 11, no. 9, pp. 884-885, 2014. **equal contribution*
6. **Alexander Lex**, Nils Gehlenborg, Hendrik Strobel, Romain Vuillemot, and Hanspeter Pfister, *UpSet: Visualization of Intersecting Sets*. IEEE Transactions on Visualization and Computer Graphics (InfoVis '14), vol. 20, no. 12, pp. 1983-1992, 2014.
7. Christian Partl, **Alexander Lex**, Marc Streit, Hendrik Strobel, Anne Mai Wasserman, Hanspeter Pfister, and Dieter Schmalstieg, *ConTour: Data-Driven Exploration of Multi-Relational Datasets for Drug Discovery*. IEEE Transactions on Visualization and Computer Graphics (VAST '14), vol. 20, no. 12, pp. 1883-1892, 2014.
8. Samuel Gratzl, Nils Gehlenborg, **Alexander Lex**, Hanspeter Pfister, and Marc Streit, *Domino: Extracting, Comparing, and Manipulating Subsets across Multiple Tabular Datasets*. IEEE Transactions on Visualization and Computer Graphics (InfoVis '14), vol. 20, no. 12, pp. 2023-2032, 2014. **Honorable Mention Award**.
9. Thomas Geymayer, Markus Steinberger, Marc Streit, **Alexander Lex**, and Dieter Schmalstieg, *Show me the Invisible: Visualizing Hidden Content*. In Proceedings of the SIGCHI Conference on Human Factors in Computing Systems (CHI '14), pp. 3705-3714, 2014. **Honorable Mention Award**.
10. Cagatay Turkyay, **Alexander Lex**, Marc Streit, Hanspeter Pfister, and Helwig Hauser, *Characterizing Cancer Subtypes using the Dual Analysis Approach in Caleydo*. IEEE Computer Graphics and Applications, vol. 34, no. 2, pp. 38-47, Mar. 2014.
11. John D. Mercer, Balaji Pandian, **Alexander Lex***, Nicolas Bonneel, and Hanspeter Pfister, *Mu-8: visualizing differences between proteins and their families*. BMC Proceedings, vol. 8, no. Suppl 2, p. S5, 2014. **corresponding author*

12. **Alexander Lex**, Christian Partl, Denis Kalkofen, Marc Streit, Anne Mai Wasserman, Samuel Gratzl, Dieter Schmalstieg, and Hanspeter Pfister, *Entourage: Visualizing Relationships between Biological Pathways using Contextual Subsets*. IEEE Transactions on Visualization and Computer Graphics (InfoVis '13), vol. 19, no. 12, pp. 2536–2545, 2013.
13. Samuel Gratzl, **Alexander Lex**, Nils Gehlenborg, Hanspeter Pfister, and Marc Streit, *LineUp: Visual Analysis of Multi-Attribute Rankings*. IEEE Transactions on Visualization and Computer Graphics (InfoVis '13), vol. 19, no. 12, pp. 2277–2286, 2013. **Best Paper Award**.
14. Christian Partl, **Alexander Lex**, Marc Streit, Denis Kalkofen, Karl Kashofer, and Dieter Schmalstieg, *enRoute: Dynamic Path Extraction from Biological Pathway Maps for Exploring Heterogeneous Experimental Datasets*. BMC Bioinformatics, vol. 14, no. Suppl 19, p. S3, Nov. 2013.
15. Christian Partl, **Alexander Lex**, Marc Streit, Denis Kalkofen, Karl Kashofer, and Dieter Schmalstieg, *enRoute: Dynamic Path Extraction from Biological Pathway Maps for In-Depth Experimental Data Analysis*. Proceedings of the IEEE Symposium on Biological Data Visualization (BioVis '12), 2012, pp. 107–114, Seattle, WA, USA, Oct. 2012. **Best Paper Award**.
16. **Alexander Lex**, Marc Streit, Hans-Jörg Schulz, Christian Partl, Dieter Schmalstieg, Peter J. Park and Nils Gehlenborg, *StratomeX: Visual Analysis of Large-Scale Heterogeneous Genomics Data for Cancer Subtype Characterization*. Computer Graphics Forum (EuroVis '12), pp. 1175-1184, 31(3), June 2012. **3rd Best Paper Award**.
17. Clemens Holzhüter, **Alexander Lex**, Dieter Schmalstieg, Hans-Jörg Schulz, Heidrun Schumann and Marc Streit, *Visualizing Uncertainty in Biological Expression Data*. Proceedings of the SPIE Conference on Visualization and Data Analysis (VDA '12), pp. 82940O, San Francisco, CA, USA, 2012.
18. Marc Streit, Hans-Jörg Schulz, **Alexander Lex**, Dieter Schmalstieg, Heidrun Schumann, *Model-Driven Design for the Visual Analysis of Heterogeneous Data*. IEEE Transactions on Visualization and Computer Graphics, pp.998-1010, 18(6), 2012.
19. **Alexander Lex**, Hans-Jörg Schulz, Marc Streit, Christian Partl and Dieter Schmalstieg, *VisBricks: Multiform Visualization of Large, Inhomogeneous Data*. IEEE Transactions on Visualization and Computer Graphics (InfoVis'11), pp. 2291-2300, 17(12), Dec. 2011.
20. Markus Steinberger, Manuela Waldner, Marc Streit, **Alexander Lex** and Dieter Schmalstieg, *Context-Preserving Visual Links*. IEEE Transactions on Visualization and Computer Graphics (InfoVis'11), pp. 2249-2258, 17(12), Dec. 2011. **Best Paper Award**.
21. Thomas Geymayer, **Alexander Lex**, Marc Streit, Dieter Schmalstieg, *Visualizing the Effects of Logically Combined Filters*. Proceedings of the Conference on Information Visualisation (IV'2011), pp. 47-52, London, UK, 2011.
22. **Alexander Lex**, Marc Streit, Christian Partl, Karl Kashofer, Dieter Schmalstieg, *Comparative Analysis of Multidimensional, Quantitative Data*. IEEE Transactions on Visualization and Computer Graphics (InfoVis'2010), 16(6), pp. 1027-1035, Nov.-Dec. 2010
23. Manuela Waldner, Werner Puff, **Alexander Lex**, Marc Streit, Dieter Schmalstieg, *Visual Links across Applications*. Proceedings of the Graphics Interface (GI) 2010, Ottawa, Ontario, Canada, May 31 - June 2 2010. **Best Student Paper Award**.
24. **Alexander Lex**, Marc Streit, Ernst Kruijff, Dieter Schmalstieg, *Caleydo: Design and Evaluation of a Visual Analysis Framework for Gene Expression Data in its Biological Context* Proceedings of the IEEE Pacific Visualization Symposium, pp. 57-64, Taipei, Taiwan, March 2010.
25. Marc Streit, **Alexander Lex**, Michael Kalkusch, Kurt Zatloukal, Dieter Schmalstieg, *Caleydo: Connecting Pathways with Gene Expression*. Bioinformatics, Oxford Journals, 25(20), pp. 2760-2761, 2009.

26. Manuela Waldner, **Alexander Lex**, Marc Streit, Dieter Schmalstieg, *Design Considerations for Collaborative Information Workspaces in Multi-Display Environments*. Proceedings of the CoVIS 2009 Workshop on Collaborative Visualization on Interactive Surfaces (IEEE VisWeek), Atlantic City, USA, October 2009.
27. Heimo Müller, Robert Reihls, Stefan Sauer, Kurt Zatloukal, Marc Streit, **Alexander Lex**, Bernhard Schlegl, Dieter Schmalstieg *Connecting Genes with Diseases*. Symposium on Information Visualization in Biomedical Informatics, 13th International Conference on Information Visualization, Barcelona, Spain, July 2009.
28. Marc Streit, **Alexander Lex**, Heimo Müller, Dieter Schmalstieg *Gaze-Based Focus Adaption in an Information Visualization System*. Computer Graphics and Visualization and Image Processing 2009 Conference (CGVCVIP), Algarve, Portugal, June 2009.

Other Publications

1. **Alexander Lex**, Nils Gehlenborg: *Points of view: Sets and intersections*. Nature Methods, vol. 11, no. 8, pp. 779, 2014.
2. Hendrik Strobel, Bilal Alsallakh, Joseph Botros, Brant Peterson, Mark Borowsky, Hanspeter Pfister, and **Alexander Lex**: *A Novel Tool for Isoform Visualization*. Poster Proceedings of the 5th Symposium on Biological Data Visualization (BioVis'15), ISMB, Dublin, Ireland, USA, 2015.
3. **Alexander Lex**, Nils Gehlenborg, Hendrik Strobel, Romain Vuillemot, Hanspeter Pfister: *UpSet for Visualizing Intersecting Sets in Biology*. Poster Proceedings of the 4th Symposium on Biological Data Visualization (BioVis'14), ISMB, Boston, MA, USA, 2014.
4. **Alexander Lex**, Marc Streit, Hans-Jörg Schulz, Christian Partl, Dieter Schmalstieg, Peter J. Park and Nils Gehlenborg: *StratomeX: Enabling Visualization-Driven Cancer Subtype Analysis*. Poster Proceedings of the IEEE Symposium on Biological Data Visualization (BioVis'12), 2012.
5. Marc Streit, **Alexander Lex**, Hans-Jörg Schulz, Christian Partl, Dieter Schmalstieg, Peter J. Park, Nils Gehlenborg: *Guided Visual Analysis for the Identification of Cancer Subtypes*. The Cancer Genome Atlas' Semi-Annual Steering Committee Meeting, Houston, TX, US, 25-27 April 2012.
6. **Alexander Lex**, Marc Streit, Hans-Joerg Schulz, Christian Partl, Dieter Schmalstieg, Peter J. Park, Nils Gehlenborg: *StratomeX – Integrative Visualization of Tumor Subtypes in Cancer Genomics Data Sets*. EMBO Workshop on Visualizing Biological Data (VizBi), Heidelberg, Germany, 6-8 March 2012.
7. **Alexander Lex**, Peter J. Park and Nils Gehlenborg: *Supporting Subtype Characterization through Integrative Visualization of Cancer Genomics Data Sets*. The Cancer Genome Atlas' 1st Annual Scientific Symposium: Enabling Cancer Research Through TCGA, November 17-18, 2011, Washington, D.C., USA
8. Marc Streit, **Alexander Lex**, Helmut Doleisch, Dieter Schmalstieg: *Does software engineering pay off for research? Lessons learned from the Caleydo project*. Poster at the Eurographics Workshop on Visual Computing for Biomedicine 2010, Leipzig, Germany, July 2010.
9. Gudrun Schmidt-Gann, Katharina Schmid, Monika Uehlein, Joachim Struck, Andreas Bergmann, Dieter Schmalstieg, Marc Streit, **Alexander Lex**, Douw G. van der Nest, Martijn van Griensven and Heinz Redl: *Gene- and Protein Expression Profiling in Liver in a Sepsis-Baboon Model*. 32nd Annual Meeting on Shock, San Antonio, Texas, USA June 6-9, 2009.

Thesis Papers

Doctoral Thesis: Visualization of Multidimensional Data with Applications in Molecular Biology

Advisor: Prof. Dieter Schmalstieg

Co-Advisor: Dr. Nils Gehlenborg, Harvard Medical School

Referee: Prof. Robert Kosara, University of North Carolina at Charlotte

Publication date: March 2012

Best Dissertation Award, Graz University of Technology

Master's Thesis: Exploration of Gene Expression Data in a Visually Linked Environment

Mentor: Prof. Dieter Schmalstieg

Publication date: June 2008

Bachelor's Thesis: Evaluation of Medical Image Viewers and Architectural Software Design for a Medical Image Viewer

Mentors: Prof. Horst Bischof, Dr. Martin Urschler

Publication date: June 2005

Tutorials

Nils Gehlenborg and **Alexander Lex**: *StratomeX & enRoute: Integrative Visualization with Caleydo* Visualizing Biological Data (VizBi) 2013, Cambridge, MA, USA, March 2013

Alexander Lex and Marc Streit: *Cancer Data Analysis with Caleydo StratomeX and enRoute* Symposium on Understanding Cancer Genomics through Information Visualization at Tokyo University, Tokyo, Japan, Feb. 2013

Marc Streit, Hans-Jörg Schulz and **Alexander Lex**: *Connecting the Dots—Showing Relationships in Data and Beyond* VisWeek'12, Seattle, WA, USA, Oct. 2012.

Conference Organizing Committees

Publicity co-chair of IEEE VIS 2016

Co-chair of Workshop on Visualization in Data Science (VDS) at IEEE VIS 2016

Publications chair of BioVis 2016

Program co-chair of Symposium on Visualization in Data Science (VDS) at IEEE VIS 2015

Poster co-chair of Symposium on Biological Data Visualization (BioVis) 2014, 2015

Website co-chair of Symposium on Biological Data Visualization (BioVis) 2014, 2015

Program Committees

IEEE InfoVis 2014, 2015, 2016

PacificVis 2016

International Symposium on Big Data Visual Analytics (BDVA), 2016

BioVis 2014, 2015, 2016

EuroVis Short Papers 2014, 2015, 2016

Conference on Human-Computer Interaction & Knowledge Discovery (HCI-KDD) 2012

International Conference on Information Visualisation (IV) 2010, 2011

Reviewing

IEEE TVCG

IEEE CG&A

IEEE Information Visualization (InfoVis) 2010-2016

IEEE Visual Analytics (VAST) 2010-2016

ACM CHI 2014-2016

EuroVis 2010-2016

BMC Bioinformatics

BioVis 2012-2016

Nucleic Acids Research

IEEE PacificVis 2010, 2011, 2013, 2015, 2016

IV 2009-2011

F1000Research

and others

Department Service

Graduate Student Advisory Council Faculty Liaison, 2017

Grad Admissions Committee, 2016

Talks, Students, Press Coverage

For a full list of students, talks and press coverage see <http://alexander-lex.net>.

Salt Lake City, UT, Sept. 7, 2016