

Thomas Höllt

Website: <http://www.thomashollt.com/>

Mail: hello@thomashollt.com

Twitter: @thomashollt

Education

04/2013 Ph.D. in Computer Science
King Abdullah University of Science and Technology, Saudi Arabia.
Visual Workflows for Oil and Gas Exploration.
Advisor: Markus Hadwiger

08/2008 Diplom Informatiker (M.Sc. Computer Science)
Universität Koblenz-Landau, Germany.
Direct Processing of Compressed Volume Data.
Advisors: Matthias Raspe, Stephan Müller

Professional Profile

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| 01/2017–today | Assistant Professor, Computational Biology Center, Leiden University Medical Center, Leiden, The Netherlands. |
| 05/2015–08/2018 | Postdoctoral Fellow, Computer Graphics and Visualization, Dept. of InSy/EEMCS, TU Delft, Delft, The Netherlands. |
| 01/2014–02/2015 | Research Consultant for Visualization, Earth Fluid Modeling and Prediction Group, King Abdullah University of Science and Technology, Thuwal, KSA. |
| 05/2013–12/2013 | Postdoctoral Fellow, GMSV (now Visual Computing Center), King Abdullah University of Science and Technology, Thuwal, KSA. |
| 03/2010–04/2013 | Ph.D. Student, GMSV (now Visual Computing Center), King Abdullah University of Science and Technology, Thuwal, KSA. |
| 02/2009–02/2010 | Researcher, VRVis Research Center, Vienna, Austria. |
| 09/2008–01/2009 | Research Assistant, Universität Koblenz Landau, Koblenz, Germany. |

Guest Research Stays

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| 07–08/2013 | Vienna University of Technology, Vienna, Austria. |
| 07–08/2011 & 2012 | SCI Institute, University of Utah, Salt Lake City, UT. |
| 06/2011 & 2012 | SimVis GmbH, Vienna, Austria. |
| 06–08/2011 | VRVis Research Center, Vienna, Austria. |

Awards

Best Paper Award at Visual Computing for Biology and Medicine 2017.

Honorable Mention for Best Paper Award at the IEEE Pacific Visualization Symposium 2013.

KAUST Academic Excellence Award, 2013.

KAUST Academic Excellence Award, 2011.

Professional Activities

Conference & Journal Reviewing

IEEE Visualization Conference; Eurographics Conference on Visualization; IEEE Pacific Visualization Symposium; Computers & Graphics; International Workshop on Visual Analytics in Healthcare; EuroVis Workshop on Reproducibility, Verification, and Validation in Visualization; Visual Computing for Biology and Medicine; Spring Conference on Computer Graphics; International Workshop on Vision, Modeling and Visualization; International Conference in Central Europe on Computer Graphics, Visualization and Computer Vision; Central European Seminar on Computer Graphics

Other Academic Activities

Abstracts Co-Chair - BioVis 2018, 2019.

Program Committee - Visual Computing for Biology and Medicine (VCBM) 2018.

Program Committee - EuroVis Workshop on Reproducibility, Verification, and Validation in Visualization (EuroRVVV) 2018.

Posters Program Committee - EuroVis 2018.

Program Committee - Spring Conference on Computer Graphics (SCCG) 2017.

Session Chair - Visual Analytics and Storytelling in Medical Visualization, EuroRV³ 2016.

Program Committee - International Symposium on Visual Computing 2013, special track on Visual Computing in Geoscience and Reservoir Engineering program committee.

Teaching Experience

2018, 2019 Co-Lecturer, TM11005: Advanced Image Processing,
Technical Medicine - TU Delft / Leiden University / Erasmus University Rotterdam

2015, 2016 Teaching Assistant, Data Visualization,
TU Delft

2011–2012 Student Supervision (Directed Research),
King Abdullah University of Science and Technology

2010, 2013 Teaching Assistant, CS 247: Scientific Visualization,
King Abdullah University of Science and Technology

2011 Teaching Assistant, CS 380: GPU and GPGPU Programming,
King Abdullah University of Science and Technology

Publications

Theses

Thomas Höllt, **Visual Workflows for Oil and Gas Exploration**, Ph.D. Thesis, King Abdullah University of Science and Technology, 2013. HDL:10754/287324

Thomas Höllt, **Direct Processing of Compressed Volume Data**, Masters Thesis, Universität Koblenz-Landau, 2008.

Preprints

Nicola Pezzotti, Alexander Mordvintsev, Thomas Höllt, Boudewijn Lelieveldt, Elmar Eisemann, and Anna Vilanova, **Linear tSNE optimization for the Web**, *Preprint, arXiv*, 2018. arXiv: 1805.10817

Rebecca D Hodge, Trygve E Bakken, Jeremy A Miller, Kimberly A Smith, Eliza R Barkan, Lucas T Graybuck, Jennie L Close, Brian Long, Osnat Penn, Zizhen Yao, eggermont, Thomas Höllt, Boaz P Levi, Soraya I Shehata, Brian Aevermann, Allison Beller, Darren Bertagnolli, Krissy Bröuner, Tamara Casper, Charles Cobbs, Rachel Dalley, Nick Dee, Song-Lin Ding, Richard G Ellenbogen, Olivia Fong, Emma Garren, Jeff Goldy, Ryder P Gwinn, Daniel Hirschstein, C Dirk Keene, Mohamed Keshk, Andrew L Ko, Kanan Lathia, Ahmed Mahfouz, Zoe Maltzer, Medea McGraw, Thuc Nghi Nguyen, Julie Nyhus, Jeffrey G Ojemann, Aaron Oldre, Sheana Parry, Shannon Reynolds, Christine Rimorin, Nadiya V Shapovalova, Saroja Soma-sundaram, Aaron Szafer, Elliot R Thomsen, Michael Tieu, Richard H Scheuermann, Rafael Yuste, Susan M Sunkin, Boudewijn Lelieveldt, David Feng, Lydia Ng, Amy Bernard, Michael Hawrylycz, John Phillips, Bosiljka Tasic, Hongkui Zeng, Allan R Jones, Christof Koch, and Ed S Lein, **Conserved Cell Types with Divergent Features Between Human and Mouse Cortex**, *Preprint, BiorXiv*, 2018. DOI: 10.1101/384826

Journal & Reviewed Conference Publications

Na Li, Vincent van Unen, Tamim Abdelaal, Nannan Guo, Sofya Kasatskaya, Kristin Ladell, James McLaren, Evgeniy Egorov, Mark Izraelson, Susana Chuva de Sousa Lopes, Thomas Höllt, Olga Britanova, eggermont, demiranda, Dmitriy Chudakov, David Price, Boudewijn Lelieveldt, and Frits Koning, **Memory CD4+ T Cells are Generated in the Human Fetal Intestine**, *Nature Immunology*, 2019. DOI: 10.1038/s41590-018-0294-9

Guillaume Beyrend, Koen Stam, Thomas Höllt, Ferry Ossendorp, and Ramon Arens, **Cytofast: A Workflow for Visual and Quantitative Analysis of Flow and Mass Cytometry Data to Discover Immune Signatures and Correlations**, *Computational and Structural Biotechnology Journal*, 2018. DOI: 10.1016/j.csbj.2018.10.004

Saskia J Santegoets, Vanessa J van Ham, Ilina Ehsan, Pornpimol Charoentong, Chantal L Duurland, Vincent van Unen, Thomas Höllt, Lilly-Ann van der Velden, Sylvia I van Egmond, Kim Kortekaas, Peggy J de Vos van Steenwijk, Mariette IE van Poelgeest, Marij J P Welters, and Sjoerd H van der Burg, **The Anatomical Location Shapes the Immune Infiltrate in Tumors of Same Etiology and Impacts Survival**, *Clinical Cancer Research*, 2018. DOI: 10.1158/1078-0432.CCR-18-1749

Sandra Laban, Jessica S. Suwandi, Vincent van Unen, Jos Pool, Joris Wesselius, Thomas Höllt, Nicola Pezzotti, Anna Vilanova, Boudewijn Lelieveldt, and Bart O. Roep, **Heterogeneity of Circulating CD8 T-cells Specific to Islet, Neo-antigen and Virus in Patients with Type 1 Diabetes Mellitus**, *PLOS one*, 13(8), e0200818, 2018. DOI: 10.1371/journal.pone.0200818

Nicola Pezzotti, Thomas Höllt, Jean-Daniel Fekete, Boudewijn Lelieveldt, Elmar Eisemann, and Anna Vilanova, **Multiscale Visualization and Exploration of Large Bipartite Graphs**, *Computer Graphics Forum (Proceedings of EuroVis 2018)*, 37(3), pp. 549–560, 2018. DOI: 10.1111/cgf.13441

Na Li, Vincent van Unen, Thomas Höllt, Allan Thompson, Jeroen van Bergen, Nicola Pezzotti, Elmar Eisemann, Anna Vilanova, Susana M. Chuva de Sousa Lopes, Boudewijn Lelieveldt, and Frits Koning, **Mass Cytometry Reveals Innate Lymphoid Cell Differentiation Pathways in the Human Fetal Intestine**, *Journal of Experimental Medicine*, 215(5) pp. 1383–1396, 2018. DOI: 10.1084/jem.20171934

Anke Redeker, Ester Remmerswaal, Esmé van der Gracht, Suzanne Welten, Thomas Höllt, Frits Koning, Luka Cicin-Sain, Janko Nikolich-Zugich, Ineke ten Berge, Rene van Lier, Vincent van Unen, and Ramon Arens, **The Contribution of Cytomegalovirus Infection to Immune Senescence is set by the Infectious Dose**, *Frontiers in Immunology*, 8(1953), 2018. DOI: 10.3389/fimmu.2017.01953

Walid M. Abdelmoula, Nicola Pezzotti, Thomas Höllt, Jouke Dijkstra, Anna Vilanova, Liam A. McDonnell, and Boudewijn Lelieveldt, **Interactive Visual Exploration of 3D Mass Spectrometry Imaging Data Using Hierarchical Stochastic Neighbor Embedding Reveals Spatiomolecular Structures at Full Data Resolution**, *Journal of Proteome Research*, 17(3), pp. 1054–1064, 2018. DOI: 10.1021/acs.jproteome.7b00725

Thomas Höllt, Nicola Pezzotti, Vincent van Unen, Frits Koning, Boudewijn Lelieveldt, and Anna Vilanova, **CyteGuide: Visual Guidance for Hierarchical Single-Cell Analysis**, *IEEE Transactions on Visualization and Computer Graphics (Proceedings of IEEE InfoVis 2017)*, 24(1), pp. 739–74, 2018. DOI: 10.1109/TVCG.2017.2744318

Nicola Pezzotti, Thomas Höllt, Jan van Gemert, Boudewijn Lelieveldt, Elmar Eisemann, and Anna Vilanova, **DeepEyes: Progressive Visual Analytics for Designing Deep Neural Networks**, *IEEE Transactions on Visualization and Computer Graphics (Proceedings of IEEE VAST 2017)*, 24(1), pp. 98–108, 2018. DOI: 10.1109/TVCG.2017.2744358

Vincent van Unen, Thomas Höllt, Nicola Pezzotti, Na Li, Marcel Reinders, Elmar Eisemann, Anna Vilanova, Frits Koning, and Boudewijn Lelieveldt, **Visual Analysis of Mass Cytometry Data by Hierarchical Stochastic Neighbor Embedding Reveals Rare Cell Types**, *Nature Communications*, 8(1740), 2017. DOI: 10.1038/s41467-017-01689-9

Changgong Zhang, Thomas Höllt, Matthan Caan, Elmar Eisemann, and Anna Vilanova, **Comparative Visualization for Diffusion Tensor Imaging Group Study at Multiple Levels of Detail**, *Visual Computing for Biology and Medicine (VCBM)*, 2017. **Best paper award**. DOI: 10.2312/vcbm.20171237

Nicola Pezzotti, Boudewijn P.F. Lelieveldt, Laurens van der Maaten, Thomas Höllt, Elmar Eisemann, and Anna Vilanova, **Approximated and User Steerable tSNE for Progressive Visual Analytics**, *IEEE Transactions on Visualization and Computer Graphics*, 23(7), pp. 1739–1752, 2017. DOI: 10.1109/TVCG.2016.2570755

Changgong Zhang, Matthan Caan, Thomas Höllt, Elmar Eisemann, and Anna Vilanova, **Overview + Detail Visualization for Ensembles of Diffusion Tensors**, *Computer Graphics Forum*, 36(3), (Proceedings EG/VGTC Conference on Visualization), 36(3), (Proceedings EG/VGTC Conference on Visualization) pp. 121–132, 2017. DOI: 10.1111/cgf.13173

Sjoerd M.H. Huisman, Baldur van Lew, Ahmed Mahfouz, Nicola Pezzotti, Thomas Höllt, Lieke Michielsen, Anna Vilanova, Marcel J.T. Reinders, and Boudewijn P.F. Lelieveldt, **BrainScope: Interactive Visual Exploration of the Spatial and Temporal Human Brain Transcriptome**, *Nucleic Acids Research*, gkx056, 2017. DOI: 10.1093/nar/gkx046

Thomas Höllt, Nicola Pezzotti, Vincent van Unen, Frits Koning, Elmar Eisemann, Boudewijn Lelieveldt, and Anna Vilanova, **Cytosplore: Interactive Immune Cell Phenotyping for Large Single-Cell Datasets**, *Computer Graphics Forum*, 35(3), (Proceedings EG/VGTC Conference on Visualization), pp. 171–180, 2016. DOI: 10.1111/cgf.12893

Nicola Pezzotti, Thomas Höllt, Boudewijn Lelieveldt, Elmar Eisemann, and Anna Vilanova, **Hierarchical Stochastic Neighbor Embedding**, *Computer Graphics Forum*, 35(3), (Proceedings EG/VGTC Conference on Visualization), pp. 21–30, 2016. DOI: 10.2312/10.1111/cgf.12878

Vincent van Unen, Ni La, Ilse Molendijk, Mine Temurhan, Thomas Höllt, Andrea E van der Meulen-de Jong, Hein W Verspaget, M Luisa Mearin, Chris J Mulder, Jeroen van Bergen, Boudewijn P. F. Lelieveldt, and Frits Koning, **Mass Cytometry of the Human Mucosal Immune System Identifies Tissue- and Disease-Associated Immune Subsets**, *Immunity*, 44(5), pp. 1227–1239, 2016.

DOI: 10.1016/j.immuni.2016.04.014

Thomas Höllt, M. Umer Altaf, Kyle T. Mandli, Markus Hadwiger, Clint N. Dawson and Ibrahim Hoteit, **Visualizing Uncertainties in a Storm Surge Ensemble Data Assimilation and Forecasting System**, *Natural Hazards*, 77(1), pp. 317–336, 2015. DOI: 10.1007/s11069-015-1596-y

Thomas Höllt, Ahmed Magdy, Peng Zhan, Guoning Chen, Ganesh Gopalakrishnan, Ibrahim Hoteit, Charles D. Hansen, and Markus Hadwiger, **Ovis: A Framework for Visual Analysis of Ocean Forecast Ensembles**, *IEEE Transactions on Visualization and Computer Graphics*, 20(8), pp. 1114–1126, 2014. DOI: 10.1109/TVCG.2014.2307892

Thomas Höllt, Ahmed Magdy, Guoning Chen, Ganesh Gopalakrishnan, Ibrahim Hoteit, Charles D. Hansen, and Markus Hadwiger, **Visual Analysis of Uncertainties in Ocean Forecasts for Planning and Operation of Off-Shore Structures**, *Proceedings of IEEE Pacific Visualization*, pp. 185–192, 2013. **Honorable mention for best paper award**. DOI: 10.1109/PacificVis.2013.6596144

Thomas Höllt, Wolfgang Freiler, Fritz Gschwantner, Helmut Doleisch, Gabor Heinemann, and Markus Hadwiger, **SeiVis: An Interactive Visual Subsurface Modeling Application**, *IEEE Transactions on Visualization and Computer Graphics*, 18(12) (Proceedings IEEE Scientific Visualization), pp. 2226–2235, 2012. DOI: 10.1109/TVCG.2012.259

Mathias Schott, Tobias Martin, A.V. Pascal Grosset, Carson Brownlee, Thomas Höllt, Benjamin P. Brown, Sean T. Smith, and Charles D. Hansen, **Combined Surface and Volumetric Occlusion Shading**, *Proceedings of IEEE Pacific Visualization*, pp. 169–176 2012. DOI: 10.1109/PacificVis.2012.6183588

Thomas Höllt, Johanna Beyer, Fritz Gschwantner, Philipp Muigg, Helmut Doleisch, Gabor Heinemann, and Markus Hadwiger, **Interactive Seismic Interpretation with Piecewise Global Energy Minimization**, *Proceedings of IEEE Pacific Visualization*, pp. 59–66, 2011. DOI: 10.1109/PacificVis.2011.5742373

Georg Geier, Thomas Pabel, Daniel Habe, Jödis Rosc, Markus Hadwiger, Thomas Höllt, and Laura Fritz, **Computertomographie als zerstörungsfreies Prüfverfahren für Gussteile**, *Druckguss*, 7(8), pp. 171–174, 2010.

Markus Hadwiger, Laura Fritz, Christof Rezk-Salama, Thomas Höllt, Georg Geier, and Thomas Pabel, **Interactive Volume Exploration for Feature Detection and Quantification in Industrial CT Data**, *IEEE Transactions on Visualization and Computer Graphics*, 14(6) (Proceedings IEEE Visualization), pp. 1507–1514, 2008. DOI: 10.1109/TVCG.2008.147

Georg Geier, Markus Hadwiger, Thomas Höllt, Laura Fritz, and Thomas Pabel, **Interaktive Exploration und Quantifizierung von Ungängen in komplexen Bauteilen**, *Proceedings of Industrielle Computertomografie (CT Tagung Wels)*, pp. 103–108, 2008.

Short Papers & Posters

Thomas Höllt, Vincent van Unen, Nicola Pezzotti, Na Li, Marcel Reinders, Elmar Eisemann, Frits Koning, Anna Vilanova, and Boudewijn Lelieveldt **Interactive Visual Analysis of Mass Cytometry Data by Hierarchical Stochastic Neighbor Embedding Reveals Rare Cell Types**, *Poster Presentation Keystone Symposia on Molecular and Cellular Biology; Single Cell Omics*, 2017.

Tamim Abdelaal, Ahmed Mahfouz, Thomas Höllt, Vincent van Unen, Frits Koning, Boudewijn P.F. Lelieveldt, Marcel J.T. Reinders **Single Cell Mass Cytometry Marker Panel Extension**, *Poster Presentation BioSB Conference, Poster Presentation Keystone Symposia on Molecular and Cellular Biology; Single Cell Omics, Poster Presentation ISMB Conference*, 2017.

Thomas Höllt, Fabio Miguel de Matos Ravanelli, Markus Hadwiger, and Ibrahim Hoteit, **Visual Analysis of Reservoir Simulation Ensembles**, *Workshop on Visualisation in Environmental Sciences (EnvirVis)*, 2016, pp. 1–4. DOI: 10.2312/envirvis.20161099

Thomas Höllt, Markus Hadwiger, Omar Knio, and Ibrahim Hoteit **Probability Maps for the Visualization of Assimilation Ensemble Flow Data**, *Workshop on Visualisation in Environmental Sciences (EnvirVis)*, pp. 43–47, 2015. DOI: 10.2312/envirvis.20151090

Thomas Höllt, Guoning Chen, Charles D. Hansen, and Markus Hadwiger, **Extraction and Visual Analysis of Seismic Horizon Ensembles**, *Proceedings of Eurographics 2013 Short Papers*, pp. 69–72, 2013. DOI: 10.2312/conf/EG2013/short/069-072

Thomas Höllt, Markus Hadwiger, Laura Fritz, Philipp Muigg, and Helmut Doleisch, **Seismic Horizon Tracing with Diffusion Tensors**, *Poster Presentation IEEE Visualization 2009, Atlantic City, NJ*, 2009.

Invited Talks

Exploration of Large Single-Cell Data with Cytosplore and HSNE. High-Performance Visualization, Visual Computing Center, King Abdullah University of Science and Technology, November, 6th, 2018.

Exploration of Large Single-Cell Data with Cytosplore and HSNE. Cytométrie 2018, 22^e congrès annuel de l’AFC, Lyon, October 18th, 2018.

Interactive Exploration of Large Single-Cell Data with HSNE. Computational Hub Meeting, Lumc, Leiden, May 22nd, 2018.

Exploration of Large Single-Cell Data with Cytosplore and HSNE. VUmc, Amsterdam, April 4th, 2018.

Exploration of Large Single-Cell Data with Cytosplore and HSNE. ICG JKU Linz Lab Talk, Johannes Kepler Universität, Linz, March 30th, 2018.

Exploration of Large Single-Cell Data with Cytosplore and HSNE. Sanquin, Amsterdam, September 28th, 2017.

Visualizing Large Single-Cell Data with HSNE. BioSB HotTopics Meeting: Single Cell Analysis, Leiden University Medical Center, Leiden, September 21st, 2017.

Interactive Visual Analysis of Large CyTOF Single-Cell Data. Department of Informatics, Visualization Group, University of Bergen, Norway, May 22nd, 2017.

Cytosplore and HSNE for Singe-Cell Exploration. Molecular Epidermology (MOLEPI) Seminar, Leiden University Medical Center, Leiden, December 13th, 2016.

Cytosplore and HSNE for Singe-Cell Exploration. Laboratorium voor Klinische en Experimentele Beeldverwerking (LKEB) Seminar, Leiden University Medical Center, Leiden, December 5th, 2016.

Cytosplore: Interactive Immune Cell Phenotyping for Large Singe-Cell Datasets. VieVisDays 2016, Vienna Symposium on Visualization, TU Wien, Vienna, June 29th, 2016.

Interactive Visual Phenotype Specification for Large Single Cell Datasets. Seminar Bioinformatics Lab, TU Delft, Delft, February 23rd, 2016.

Interactive Phenotype Specification for Large Single Cell Datasets. Netherlands eScience Center Symposium: The Science of Big-Data Analytics & Visualization, Utrecht, November 23rd, 2015.

Ovis: A Framework for Visual Analysis of Ocean Forecast Ensembles. Seminar Computer Graphics and Visualization, TU Delft, Delft, February 10th, 2015.

Visual Workflows for Oil and Gas Exploration. Earth Sciences and Engineering Seminar, Physical Sciences and Engineering Division, King Abdullah University of Science and Technology, Thuwal, February 12th, 2013.

Interactive Seismic Interpretation. VRVis Forum, VRVis, Vienna, July 22nd, 2010.

Peer Reviewed Paper/Conference Talks

Interactive Visual Analysis of Mass Cytometry Data by Hierarchical Stochastic Neighbor Embedding Reveals Rare Cell Types. ISMB/BioVis, July 9th, 2018.

CyteGuide: Visual Guidance for Hierarchical Single-Cell Analysis. IEEE Visualization (InfoVis), October 10th, 2017.

Cytosplore: Interactive Immune Cell Phenotyping for Large Single-Cell Datasets. EG/VGTC Conference on Visualization (EuroVis), June 8th, 2016.

Visual Analysis of Reservoir Simulation Ensembles. Workshop on Visualisation in Environmental Sciences (EnvirVis), June 6th, 2016.

Probability Maps for the Visualization of Assimilation Ensemble Flow Data. Workshop on Visualisation in Environmental Sciences (EnvirVis), May 26th, 2015.

Extraction and Visual Analysis of Seismic Horizon Ensembles. Eurographics, May 8th, 2013.

Visual Analysis of Uncertainties in Ocean Forecasts for Planning and Operation of Off-Shore Structures. IEEE Pacific Visualization, February 28th, 2013.

SeiVis: An Interactive Visual Subsurface Modeling Application. IEEE Visualization (SciVis), October 18th, 2012.

Interactive Seismic Interpretation with Piecewise Global Energy Minimization. IEEE Pacific Visualization, March 2nd, 2011.