Colin B. Hansen

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PROFESSIONAL SUMMARY

I am a 4th year computer science graduate student at Vanderbilt University. My research is based in diffusion weighted MRI acquisition harmonization, and relies on both traditional machine learning techniques and deep learning models. I'm looking for positions in industry which allow me to use my skills in medical image processing and in research.

EDUCATION

Vanderbilt University, Nashville, TN
Ph.D. Computer Science 2017 - Current
Relevant Courses –Deep Learning for Medical Image Computing, Quantitative Medical Image Analysis, Machine Learning, Reinforcement Learning, Advanced Image Processing

Buena Vista University, Storm Lake, IA
B.S. Computer Science, summa cum laude 2017

HONORS AND AWARDS

- **IBM Graduate Fellowship,** Vanderbilt University, 2017
- **Trustee Scholarship,** Buena Vista University, 2013

WORK AND RESEARCH EXPERIENCE

Vanderbilt University, Nashville TN
Research Assistant, Medical-Image Analysis and Statistical Interpretation Lab June 2018 - Current
- Developing and analyzing methods that enhance and harmonize diffusion MRI acquisitions across sites.

Siemens Healthineers, Malvern PA
Image Analytics Intern May 2019 - August 2019
- Developed deep learning methods as a part of a computer aided diagnosis system targeting lung cancer diagnosis.

Vanderbilt University, Nashville TN
Teaching Assistant, Department of Electrical Engineering and Computer Science
CS 2201 – Program Design and Data structures Sept. – May 2018
- Provided feedback and graded programming projects and course exams
- Held 4 hours weekly office hours

PROJECTS

Deep Learning Harmonization Jan. 2019 – Current
- Developing several 3D deep learning models with the goal of capturing scanner specific effects while predicting a subject's acquisition from one scanner given the acquisition from another
- Using PyTorch v0.4.1 on a high-performance computing cluster with Nvidia Titan X GPUs

Contrastive and Holistic Semi-supervised Learning Dec. 2018 – Current

- Showing that equivalence classes can be leveraged with a triplet loss in a semi-supervised framework for classification maintaining accuracy with state-of-the-art architectures while reducing the annotated training set by 40%
- Using PyTorch v0.4.1 on a high-performance computing cluster with Nvidia Titan X GPUs

Characterization of Variation in CSF May 2018 – Aug. 2018

- Modeled and analyzed the variation in the diffusion signal in cerebral spinal fluid regions of the brain and the correlation with scan parameters

Spatial Signal Drift Correction Sept. 2017 – June 2018

- Proposed a method for correcting spatially varying signal drift that affects demanding diffusion MRI acquisitions

PROGRAMMING SKILLS

- Experienced in Python, PyTorch, SLURM, MATLAB

PUBLICATIONS

Journal

Colin B. Hansen*; Qi Yang*; Ilwoo Lyu; Francois Rheault; Cailey Kerley; Bramsch Chandio; Shreyas Fadnavis; Owen Williams; Andrea Shafer; Susan Resnick; David Zald; Laurie Cutting; Warren Taylor; Brian Boyd; Eleftherios Garyfallidis; Adam Anderson; Maxime Descoteaux; Bennett Landman; Kurt Schilling. Pandora: 4-D White Matter Bundle Population-Based Atlases Derived from Diffusion MRI Fiber Tractography. Neuroinform (2020).

Colin B. Hansen, Baxter P. Rogers, Kurt G. Schilling, Vishwesh Nath, Justin A. Blaber, Okan Irfanoglu, Alan Barnett, Carlo Pierpaoli, Adam W. Anderson, Bennett A. Landman. "Empirical field mapping for gradient nonlinearity correction of multi-site diffusion weighted MRI." Magnetic Resonance Imaging 2020.

Colin B. Hansen, Vishwesh Nath, Allison E. Hainline, Kurt G. Schilling, Prasanna Parvathaneni, Roza G. Bayrak, Justin A. Blaber, Okan Irfanoglu, Carlo Pierpaoli, Adam W. Anderson, Baxter P. Rogers, Bennett A. Landman. "Characterization and Correlation of Signal Drift in Diffusion Weighted MRI". Magnetic Resonance Imaging (2018).

Kurt G Schilling*, Justin Blaber*, **Colin B. Hansen**, Baxter Rogers, Adam W Anderson, Seth A Smith, Praitayini Kanakaraj, Tonia Rex, Susan M. Resnick, Andrea T. Shafer, Laurie Cutting, Neil Woodward, David Zald, Bennett A Landman."Distortion correction of diffusion weighted MRI without reverse phase-encoding scans or field-maps". PLoS ONE 15(7)

Kurt G Schilling, Yuankai Huo, Allen Newton, **Colin B. Hansen**, Vishwesh Nath, Andrea T. Shafer, Owen Williams, Susan M. Resnick, Baxter Rogers, Adam W Anderson, Bennett A Landman. "Synthesized b0 for diffusion distortion correction (Synb0-DisCo)." Magnetic Resonance Imaging. 2019 May 7.

Schilling, Kurt G., Vishwesh Nath, **Colin B. Hansen**, Prasanna Parvathaneni, Justin Blaber, Yurui Gao, Peter Neher et al. "Limits to anatomical accuracy of diffusion tractography using modern approaches." *NeuroImage* 185 (2019): 1-11.

Nath, Vishwesh, Kurt G. Schilling, Prasanna Parvathaneni, **Colin B. Hansen**, Allison E. Hainline, Yuankai Huo, Justin A. Blaber et al. "Deep learning reveals untapped information for local white-matter fiber reconstruction in diffusion-weighted MRI." *Magnetic resonance imaging* 62 (2019): 220-227.

Kurt G Schilling, Fang-Cheng Yeh, Vishwesh Nath, **Colin B. Hansen**, Owen Williams, Susan Resnick, Adam W. Anderson, Bennett A. Landman. "A fiber coherence index for quality control of B-table orientation in diffusion MRI scans". Magnetic Resonance Imaging.

Kurt G Schilling, Vishwesh Nath, **Colin B. Hansen**, Prasanna Parvathaneni, Justin Blaber, Yurui Gao, Peter Neher, Dogu Baran Aydogan, Yonggang Shi, Mario Ocampo-Pineda, Simona Schiavi, Alessandro Daducci , Gabriel Girard, Muhamed Barakovic, Jonathan Rafael-Patino, David Romascano, Gaëtan Rensonnet, Marco Pizzolato, Alice Bates, Elda Fischi, Jean-Philippe Thiran, Erick J. Canales-Rodríguez, Chao Huang, Hongtu Zhu, Liming Zhong, Ryan Cabeen, Arthur W Toga, Francois Rheault, Guillaume Theaud, Jean-Christophe Houde, Jasmeen Sidhu, Maxime Chamberland, Carl-Fredrik Westin, Tim B. Dyrby, Ragini Verma, Yogesh Rathi, M Okan Irfanoglu, Cibu Thomas, Carlo Pierpaoli, Maxime Descoteaux, Adam W Anderson, Bennett A Landman. "Limits to the anatomical accuracy of diffusion tractography using modern approaches". Neuroimage. 2019 Jan 15;185:1-11.

Highly Selective Conference Proceedings

Vishwesh Nath, Ilwoo Lyu, Kurt Schilling, Prasanna Parvathaneni, **Colin B. Hansen**, Yuankai Huo, Vaibhav Janve, Yurui Gao, Iwona Stepniewska, Adam Anderson, Bennett Landman. "Enabling Multi-Shell b-Value Generalizability of Data-Driven Diffusion Models with Deep SHORE." In International Conference on Medical Image Computing and Computer Assisted Intervention (MICCAI), LNCS11766, pp. 573-581, Shenzhen, China, 2019.

Vishwesh Nath, Prasanna Parvathaneni, **Colin B. Hansen**, Allison E. Hainline, Camilo Bermudez, Samuel Remedios, Justin A. Blaber et al. "Inter-scanner harmonization of high angular resolution DW-MRI using null space deep learning." In *International Conference on Medical Image Computing and Computer-Assisted Intervention*, pp. 193-201. Springer, Cham, 2019.

Full Length Conference Proceedings

Colin B. Hansen, Vishwesh Nath, Riqiang Gao, Camilo Bermudez, Yuankai Huo, Kim L. Sandler, Pierre P. Massion, Jeffrey D. Blume, Thomas A. Lasko, Bennett A. Landman "Semi-supervised Machine Learning with MixMatch and Equivalence Classes." Interpretable and Annotation-Efficient Learning for Medical Image Computing. Springer, Cham, 2020. 112-121.

Colin B. Hansen, Yiyuan Zhao, Halid Yerebakan, Luca Bogoni, and Anna Jerebko. "False positive reduction of vasculature for pulmonary nodule detection." In Medical Imaging 2020: Computer-Aided Diagnosis, vol. 11314, p. 113142B. International Society for Optics and Photonics, 2020.

Colin B. Hansen, Vishwesh Nath, Allison E. Hainline, Kurt G. Schilling, Prasanna Parvathaneni., Roza G. Bayrak, Justin A. Blaber, Owen Williams, Susan Resnick, Lori Beason-Held, Okan Irfanoglu, Carlo Pierpaoli, Adam W. Anderson, Baxter P. Rogers, Bennett A. Landman. Consideration of cerebrospinal fluid intensity variation in diffusion weighted MRI. Paper presented at the Medical Imaging 2019: Physics of Medical Imaging.

Vishwesh Nath, Samuel Remedios, Prasanna Parvathaneni, **Colin B. Hansen**, Roza G. Bayrak, Camilo Bermudez, Justin A. Blaber, Karthik Ramadass, Kurt G. Schilling, Vaibhav A. Janve, Yurui Gao, Yuankai Huo, Ilwoo Lyu, Owen Williams, Susan Resnick, Lori Beason-Held, Baxter P. Rogers, Iwona Stepniewska, Adam W. Anderson, Bennett A. Landman, "Harmonizing 1.5T/3T Diffusion Weighted MRI through Development of Deep Learning Stabilized Microarchitecture Estimaors", SPIE Medical Imaging, San Diego, CA, 2019