Colin B. Hansen

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https://hanscol.github.io

PROFESSIONAL SUMMARY

My research is based in diffusion weighted MRI acquisition harmonization and relies on both traditional machine learning techniques and deep learning models. My dissertation focuses on correcting for spatial and temporal instabilities in MRI systems, designing atlases and models which provide white matter bundle information, and developing semi-supervised methods for multi-site harmonization. I am interested in leveraging high dimensional data analytics for health and information systems.

EDUCATION

Vanderbilt University, Nashville, TN
Ph.D. Computer Science 2021

- Thesis: Empirical and Data-drive Harmonization of Diffusion Weighted MRI
- Advised by Bennett Landman: Medical-image Analysis and Statistical Interpretation Lab

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

TECHNICAL SKILLS

- Experienced in Python, **PyTorch**, **HPC**, MATLAB, **Docker**, and Singularity
- Experienced using ACCRE, a tier 2 HPC (**SLURM**) used for the Large Hadron Collider

PROFFESIONAL EXPERIENCE

Vanderbilt University, Nashville TN
Research Assistant, Medical-Image Analysis and Statistical Interpretation Lab June 2018 - Current

- Developed and analyzed methods that enhance and harmonize diffusion MRI acquisitions across sites and methods that estimate resulting white matter structures

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. 2017 - May 2018

- Provided feedback and graded programming projects and course exams
- Held 4 hours weekly office hours

HONORS AND AWARDS

- **Summa Cum Laude Merit Award**, ISMRM Conference, 2020
- **IBM Graduate Fellowship,** Vanderbilt University, 2017
- **Trustee Scholarship,** Buena Vista University, 2013

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.

Leon Y. Cai, Qi Yang, **Colin B. Hansen**, Vishwesh Nath, Karthik Ramadass, et al. "PreQual: An automated pipeline for integrated preprocessing and quality assurance of diffusion weighted MRI images". Magnetic Resonance in Medicine, 86(1), 456-470.

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