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jessexknight

Jesse Knight

Education

2015-09 – 2017-12 **MASc, Engineering Systems & Computing**, *University of Guelph*, GPA: 94.0.

- Produced a novel MRI segmentation algorithm and cross validation techniques
- Explored classic and deep learning image analysis models through coursework

2011-09 – 2015-05 **BEng, Biomedical Engineering**, *University of Guelph*, GPA: 93.7.

- Foci: medical image and biomedical signal acquisition and analysis

Research Experience

2015-09 – 2017-12 **MASc Thesis**, *University of Guelph, Supervisors: Graham Taylor & April Khademi.*

Title: *Voxel-Wise Image Analysis for White Matter Hyperintensity Segmentation*

- Developed a new segmentation algorithm for white matter lesion in brain MRI
- Improved estimation of model performance on new data sources – e.g. MRI scanners – through Leave-One-Source-Out Cross Validation: a novel CV framework
- Presented interim and final results at 2 international competitions (MICCAI) and several provincial conferences

2014-05 – 2014-08 **Research Assistant**, *Dr. Aviv, Dept. Medical Imaging, Sunnybrook Research Inst.*

Project: *Localizing the impact of collateral circulation in acute ischemic stroke*

- Created probabilistic spatial maps of stroke risk, stratified by clinical factors
- Developed MATLAB GUI for intuitive exploration of results by clinical collaborators
- Wrote documented software for other image processing pipelines in the lab

2013-05 – 2013-08 **Research Assistant**, *Dr. Eberl, Biophysics Interdept. Group, University of Guelph.*

Project: *A mass-balance model of the human anaerobic colon*

- Collaborated with graduate students and faculty to expand model dimensionality

Engineering Design & Programming Experience

Programming, Language: years.

MATLAB: 6 | Python: 2 | LaTeX: 2 | HTML/CSS/JS/MySQL: 1 | C/C++: 1 | Git: 2

2015-09 – 2017-12 **Graduate Course Projects**, *Guelph School of Engineering.*

- Convolutional Neural Network for breast cancer image labelling (histopathology)
- Explored Neural Network solutions to Kaggle Competitions using remote computing

Personal web projects:.

- EWH Repairs Database – generating online summary reports of field repairs
- Kickbike Ontario – small business website with integrated PayPal buy buttons
- BibTable – generating HTML/JS and LaTeX tables from .bib files with Python

2015-06 – 2015-07 **Summer Institute**, *Engineering World Health*, Kigali/Kibuye Rwanda.

- Worked with local technicians at Kibuye Hospital to repair medical equipment
- Identified and presented design project ideas to 3rd year engineering design teams on return; supported groups during design work with and contextual knowledge

2011-09 – 2015-05 **Undergraduate Design Projects**, *Guelph School of Engineering.*

- 6 projects on biomechanical and biosignal topics; groups of 3–4, plus external partners
- Deliverables: proposal, interim and final reports, presentation, and prototype

Teaching Experience

2015-09 – 2017-04 **Teaching Assistant**, *Guelph School of Engineering.*

4th yr Medical Imaging Modalities	2015-09–12, 2017-09–12
4th yr Medical Image Processing	2016-01–04, 2017-01–04
3rd yr Systems & Control Theory	2017-01–04
3rd yr Signal Processing	2016-09–12
4th yr Biomedical Signal Processing	2016-01–04

- Planned and lead weekly tutorials on medical imaging topics for 10 to 80 students; created problem sets and solutions, revised lab manuals for 4 courses
- Assisted students with MATLAB and C code by email and in person; facilitated labs involving: optical CT, EF-MRI, EEG, EMG, and ECG acquisition and post-processing
- Developed and presented three 90 min lectures in professor's absence
- Nominated for (2016) and won (2017) Engineering TA of the Year Award

2013-08 – 2016-12 **Engineering Peer Helper**, *University of Guelph.*

- Facilitated weekly course help sessions and exam reviews for up to 200 students
- Lead a transition to online scheduling by students instead of weekly static sessions; developed shared email and calendar protocols for responding to requests

2017-01 – 2017-03 **Faculty Hiring Committee**, *Guelph School of Engineering.*

Awards & Scholarships

Research Scholarships

2016-09 – 2017-08 $15,000 – OGS–M for: White Matter Lesion Segmentation in MRI

2015-09 – 2016-08 $17,500 – CGS–M (NSERC) for: White Matter Lesion Segmentation in MRI

2014-05 – 2014-08 $7,000 – Hurvitz Brain Sciences Summer Student, Sunnybrook Research Institute

2013-05 – 2013-08 $7,000 – Undergrad Student Research Award, U of G

Awards

2017 Engineering Teaching Assistant of the Year

2012 – 2017 Dean's Scholarship

2016, 2017 Engineering Peer Helper of the Year

2015 College of Physical and Engineering Sciences Nominee for W.C. Winegard Medal

University of Guelph top convocation award to an undergraduate student

2015 Helen Grace Tucker Design Award

2015 Association of the Professional Engineers Medal

2015 College of Physical and Engineering Science Society of Excellence

Volunteering & Extracurriculars

2014-08 – 2017-04 **Bike Centre Volunteer**, *CSA Bike Center, University of Guelph.*

2014-01 – 2015-04 **Treasurer**, *Engineering World Health, University of Guelph.*

2014-09 – 2015-04 **Novice Men's Rowing Crew**, *University of Guelph.*

2012-09, 2014-09 **Engineering Big Buddy**, *University of Guelph.*

2013, 2014-03 **Project Serve Volunteer**, *University of Guelph.*

2012-09 – 2012-12 **Bookshelf Tutor**, *University of Guelph.*

2009-09 – 2011-06 **World Action Awareness Club**, *Mayfield SS*, President (2010 – 2011).

Publications

Articles

Knight, J. Khademi, A. Taylor, G. (under revision). "Voxel-Wise Logistic Regression and Leave-One-Scanner-Out Cross Validation for White Matter Hyperintensity Segmentation". In: *NeuroImage*.

Knight, J. Taylor, G. W. Khademi, A. (2017). "Equivalence of histogram equalization, histogram matching and the Nyul algorithm for intensity standardization in MRI". In: *Journal of Computational Vision and Imaging Systems* 3.1.

Huynh, D. C. Parsons, M. W. Wintermark, M. Vagal, A. D'Esterre, C. D. Vitorino, R. Efkehari, D. **Knight, J.** Huynh, T. J. Bivard, A. Swartz, R. Symons, S. Aviv, R. I. (2016). "Can CT perfusion accurately assess infarct core?" In: *Neurovascular Imaging* 2.7, pp. 1–7. DOI: 10.1186/s40809-016-0018-1.

Fanou, E. M. **Knight, J.** Aviv, R. I. Hojjat, S.-P. Symons, S. P. Zhang, L, Wintermark, M, (2015). "Effect of Collaterals on Clinical Presentation, Baseline Imaging, Complications, and Outcome in Acute Stroke". In: *AJNR. American journal of neuroradiology* 36.12, pp. 2285–91. DOI: 10.3174/ajnr.A4453.

Conferences

Knight, J. Khademi, A. (2016). "MS Lesion Segmentation Using FLAIR MRI Only". In: *MSSEG Challenge Proceedings: Multiple Sclerosis Lesions Segmentation Challenge Using a Data Management and Processing Infrastructure*. Athens, Greece, p. 21.

Knight, J. Moody, A. R. Khademi, A. (2016). "Noise in parallel MRI: how to determine whether single-coil assumptions still hold (they don't) (Poster)". In: *Imaging Network Ontario Symposium*. Toronto. DOI: 10.13140/RG.2.2.11028.91527.

Book Chapters

Knight, J. Khademi, A. (2017). "Disease-Inspired Feature Design for Computer-Aided Diagnosis of Breast Cancer Digital Pathology Images". In: *Medical Image Analysis and Informatics: Computer-aided Diagnosis and Therapy 2*. Ed. by Paulo Mazzoncini de Azevedo Marques, Arianna Mencattini, Marcello Salmeri, and Rangaraj M Rangayyan. CRC Press.

Reiche, B. **Knight, J.** Moody, A. R. Khademi, A. (2017). "Segmentation and Characterization of WML in FLAIR MRI". In: *Medical Image Analysis and Informatics: Computer-aided Diagnosis and Therapy 2*. Ed. by Paulo Mazzoncini de Azevedo Marques, Arianna Mencattini, Marcello Salmeri, and Rangaraj M Rangayyan. CRC Press.

Thesis

Knight, J. (2017). "Voxel-Wise Image Analysis for White Matter Hyperintensity Segmentation". Master of Applied Science. University of Guelph.

Reviewer Work

IEEE International Humanitarian Technology Conference	1 review
Canadian Journal of Electrical and Computer Engineering	2 reviews
Canadian Conference of Electrical and Computer Engineering	2 reviews