

# Tyler L. HAYES

## PERSONAL DATA

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CITIZENSHIP: United States of America

## RESEARCH INTERESTS

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Lifelong Machine Learning, Computer Vision, Deep Learning

## EDUCATION

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AUG. 2016 - Doctor of Philosophy in IMAGING SCIENCE  
MAY 2021 **Rochester Institute of Technology**, Rochester, NY  
Advisors: Dr. Nathan Cahill and Dr. Christopher Kanan  
GPA: 3.81/4.0

JAN. 2015 - Master of Science in APPLIED AND COMPUTATIONAL MATHEMATICS  
MAR. 2017 **Rochester Institute of Technology**, Rochester, NY  
Advisor: Dr. Nathan Cahill  
GPA: 4.0/4.0

SEPT. 2011 - Bachelor of Science in APPLIED MATHEMATICS  
MAY 2014 **Rochester Institute of Technology**, Rochester, NY  
GPA: 3.65/4.0, *Magna Cum Laude*  
*Alpha Sigma Lambda Honorary Society*

## PEER-REVIEWED CONFERENCE PAPERS

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N.D. Cahill, T.L. Hayes, R.T. Meinhold, and J.F. Hamilton. Compassionately conservative balanced cuts for image segmentation. *In: Proc. IEEE Conference on Computer Vision and Pattern Recognition (CVPR)*, 2018

R. Kemker, M. McClure, A. Abitino, T.L. Hayes, and C. Kanan. Measuring catastrophic forgetting in neural networks. *In: AAAI*, 2018

## CONFERENCE PAPERS

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T.L. Hayes, R.T. Meinhold, J.F. Hamilton, and N.D. Cahill. Piecewise flat embeddings for hyperspectral image analysis. *In: Proc. SPIE DCS Defense and Security: Algorithms and Technologies for Multispectral, Hyperspectral, and Ultraspectral Imagery XXIII*, 2017

R.T. Meinhold, T.L. Hayes, and N.D. Cahill. Efficiently computing piecewise flat embeddings for data clustering and image segmentation. *In: Proc. IEEE MIT Undergraduate Research and Technology Conference*, 2016

## ABSTRACTS AND POSTERS WITHOUT PROCEEDINGS

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**T.L. Hayes**, R. Kemker, N.D. Cahill, and C. Kanan. New metrics and experimental paradigms for continual learning. *CVPR Workshop: Real-World Challenges and New Benchmarks for Deep Learning in Robotic Vision*, Salt Lake City, UT, 2018

**T.L. Hayes**, R. Kemker, M. McClure, A. Abitino, and C. Kanan. Measuring catastrophic forgetting in neural networks. *Conference on Data Analysis (CoDA)*, Santa Fe, NM, 2018

## THESIS

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**T.L. Hayes**. Compassionately conservative normalized cuts for image segmentation. *M.S. Thesis, Rochester Institute of Technology*, 2017

## RESEARCH EXPERIENCE

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AUG. 2017 - PRESENT	GRADUATE RESEARCH ASSISTANT Machine and Neuromorphic Perception Laboratory (kLab) <b>Rochester Institute of Technology</b> , Rochester, NY <b>Topics:</b> Lifelong Machine Learning, Deep Learning, Continual Learning
JUNE 2017 - AUG. 2017	GRADUATE RESEARCH INTERN Naval Research Enterprise Internship Program (NREIP) by the American Society for Engineering Education (ASEE) <b>U.S. Naval Research Laboratory (NRL)</b> , Washington, DC <b>Tasks:</b> Assessed the validity of the manifold hypothesis within deep neural networks. Utilized dimensionality reduction and intrinsic dimension estimation techniques to characterize feature manifolds.
JAN. 2016 - MAY 2017	GRADUATE RESEARCH ASSISTANT Image Computing and Analysis Laboratory (ICAL) <b>Rochester Institute of Technology</b> , Rochester, NY <b>Tasks:</b> Developed a new cut cost and optimization algorithm for graph-based image segmentation with ties to manifold learning.

## WORK EXPERIENCE

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JUNE 2015 - AUG. 2015	IMAGE SCIENCE INTERN <b>UTC Aerospace Systems</b> , Westford, MA <b>Tasks:</b> Implemented Non-Linear Least Squares optimizer to fit functions to edge spread data. Derived metrics from fitted edge data to evaluate resolution sharpness metrics of airborne sensors and quantified confidence estimates using bootstrap resampling.
OCT. 2014 - JAN. 2015	STAFFING COORDINATOR <b>Durham Staffing</b> , Depew, NY <b>Tasks:</b> Contacted employees regarding job opportunities and answered employee and client questions via phone. Administered and organized application materials. Maintained notes on applicants in database.

JUNE 2014 - SEPT. 2014	IT ANALYST - TECHNICAL DEVELOPMENT PROGRAM <b>Liberty Mutual Insurance</b> , Portsmouth, NH <b>Tasks:</b> Led case study presentation on gamification of roadway safety. Co-ordinated process improvement project to improve productivity trackers. Created workflow diagrams and traceability matrices for process improvement projects.
MAY 2013 - AUG. 2013	INFORMATION TECHNOLOGY INTERN <b>Liberty Mutual Insurance</b> , Portsmouth, NH <b>Tasks:</b> Researched and compiled presentations on statistical models and statistical software used for predictive analytics. Developed use cases involving loss triangling methods and fraud detection techniques.

## TEACHING EXPERIENCE

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AUG. 2016 - MAY 2017	GRADUATE TEACHING ASSISTANT Chester F. Carlson Center for Imaging Science <b>Rochester Institute of Technology</b> , Rochester, NY <b>Classes:</b> Deep Learning for Vision (Grad.), Image Processing and Computer Vision (Grad.) <b>Tasks:</b> Completed and held office hours to help with homework assignments. Graded and offered suggestions on homework, proposals, projects, and presentations.
JAN. 2015 - MAY 2016	GRADUATE TEACHING ASSISTANT School of Mathematical Sciences <b>Rochester Institute of Technology</b> , Rochester, NY <b>Award:</b> Student Achievement Honors for Outstanding Teaching Assistant, <i>April 2016</i> <b>Classes:</b> Calculus (B, C, I, II) <b>Tasks:</b> Assisted students with in-class workshops and graded homework assignments.
JAN. 2014 - MAY 2014	LEARNING ASSISTANT School of Mathematical Sciences <b>Rochester Institute of Technology</b> , Rochester, NY <b>Class:</b> Mathematics of Graphical Simulation <b>Tasks:</b> Created notes and graded group worksheets. Held recitation sessions for assistance with homework and class concepts.
SEPT. 2012 - DEC. 2013	GRADER School of Mathematical Sciences <b>Rochester Institute of Technology</b> , Rochester, NY <b>Award:</b> Student Achievement Honors for the Best Grader, <i>April 2013</i> <b>Classes:</b> Multivariable Calculus, Differential Equations, Probability and Statistics <b>Tasks:</b> Graded homework assignments.

## SKILLS

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Deep Learning Packages:	TensorFlow, Keras, MatConvNet
Competent in Programming:	Python, MATLAB
Also Familiar With:	Java
Operating Systems:	Linux (Ubuntu), Microsoft Windows
Applications:	Microsoft Office, Word, Excel, Outlook, SharePoint, $\text{\LaTeX}$

## REVIEWER

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IEEE International Conference on Image Processing (ICIP)  
IEEE International Symposium on Biomedical Imaging (ISBI) [Delegate Reviewer]

## ACTIVITIES

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**RIT Ukulele Club**, Cofounder, Member (2014-Present), Vice President (2013-2014),  
Treasurer (2012-2013)  
**RIT Alpine Ski Team**, Member (2012-2014)  
**RIT Concert Band**, Member (2011-2013)