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John P. Lalor

Research Interests

My research is in machine learning and natural language processing. I am particularly interested in model evaluation and quantifying uncertainty, as well as applications in medical informatics.

Education

2020 **Ph.D. Computer Science**, University of Massachusetts, Amherst, MA.
Advisor: Hong Yu
Thesis: Learning Latent Characteristics of Data and Models using Item Response Theory

2015 **M.S. Computer Science**, DePaul University, Chicago, IL.

2011 **B.B.A. IT Management**, University of Notre Dame, South Bend, IN.
Minor: Irish Language and Literature

Employment

2019 - **Instructor**, *University of Notre Dame*, Notre Dame, IN.
Mendoza College of Business
Department of Information Technology, Analytics, and Operations

Summer 2018 **Applied Scientist Intern**, Amazon Alexa, Cambridge, MA.
Supervisors: Bill Campbell and Eunah Cho

Summer 2017 **Applied Scientist Intern**, Amazon Alexa, Cambridge, MA.
Supervisors: Imre Kiss and Francois Mairesse

2017 - 2019 **Research Assistant**, Veterans Affairs Medical Center, Center for Healthcare Organization and Implementation Research, Bedford, MA.

Summer 2016 **Intern**, ESPN Advanced Technology Group, Bristol, CT.
Supervisor: Zvi Topol

2015 - 2019 **Research Assistant**, BioNLP Group, Amherst, MA.
Supervisor: Hong Yu

2013 - 2015 **Software Developer**, Eze Software Group, Chicago, IL.

2011 - 2013 **Advisory Associate**, KPMG, Chicago, IL.

Publications

Manuscripts Under Review

20 **J.P. Lalor**, H. Yu. Dynamic Data Selection for Curriculum Learning by Ability Estimation.

Journal and Conference Publications

19 **J.P. Lalor**, H. Wu, H. Yu. Learning Latent Parameters without Human Response Patterns: Item Response Theory with Artificial Crowds. *EMNLP-IJCNLP 2019: Conference on Empirical Methods in Natural Language Processing and International Joint Conference on Natural Language Processing*, 2019

18 J. Chen, **J.P. Lalor**, W. Liu, E. Druhl, H. Yu. Detecting Hypoglycemia Incidents Reported in Patients' Secure Messages: Using Cost-sensitive Learning and Oversampling to Reduce Data Imbalance. *J Med Internet Res* 2019;21(3):e11990. doi:10.2196/11990

17 **J.P. Lalor**, B. Woolf, H. Yu. Improving EHR Note Comprehension with NoteAid: A Randomized Trial of EHR Note Comprehension Interventions with Crowdsourced Workers. *J Med Internet Res* 2019;21(1):e10793. doi:10.2196/10793.

16 **J.P. Lalor**, H. Wu, T. Munkhdalai, H. Yu. Understanding Deep Learning Performance through an Examination of Test Set Difficulty: A Psychometric Case Study. *EMNLP 2018: Conference on Empirical Methods in Natural Language Processing*, 2018.
Oral presentation, top 10% of short papers

15 **J.P. Lalor**, H. Wu, L. Chen, K. Mazor, H. Yu. ComprehENotes, an Instrument for Assessing Patient Electronic Health Record Note Reading Comprehension: Development and Validation. *J Med Internet Res* 2018;20(4):e139. doi:10.2196/jmir.9380

14 **J.P. Lalor**, H. Wu, H. Yu. Building an Evaluation Scale using Item Response Theory. *EMNLP 2016: Conference on Empirical Methods in Natural Language Processing*, Austin, TX, USA, November 2016.

13 C. Miller, A. Settle, **J.P. Lalor**. Learning Object-Oriented Programming in Python: Towards an Inventory of Difficulties and Testing Pitfalls. *SIGITE 2015: The Special Interest Group for Information Technology Education Conference*, Chicago, IL, October 2015

12 A. Settle, **J.P. Lalor**, T. Steinbach. Evaluating a Linked-Courses Learning Community for Development Majors. *SIGITE 2015: The Special Interest Group for Information Technology Education Conference*, Chicago, IL, October 2015

11 A. Settle, **J.P. Lalor**, T. Steinbach. A Computer Science Linked-Courses Learning Community. *ITiCSE 2015: The 20th Annual Conference on Innovation and Technology in Computer Science Education*. Vilnius, Lithuania, July 2015

10 A. Settle, **J.P. Lalor**, T. Steinbach. Reconsidering the Impact of CS1 on Novice Attitudes. *SIGCSE 2015: The ACM Special Interest Group on Computer Science Education*. Kansas City, MO, March 2015

Workshop Papers, Posters, and Abstracts

9 E. Cho, H. Xie, **J.P. Lalor**, V. Kumar, W. M. Campbell. Efficient Semi-Supervised Learning for Natural Language Understanding by Optimizing Diversity. *ASRU 2019: the IEEE Automatic Speech Recognition and Understanding Workshop* Paper, 2019.

8 **J.P. Lalor**, H. Wu, H. Yu. Learning Latent Parameters without Human Response Patterns: Item Response Theory with Artificial Crowds. *NAACL Workshop on Shortcomings in Vision and Language (SiVL)* Extended Abstract, 2019.

7 **J.P. Lalor**, H. Wu, H. Yu. Comparing Human and DNN-Ensemble Response Patterns for Item Response Theory Model Fitting. *NAACL Workshop on Cognitive Modeling and Computational Linguistics (CMCL)* Extended Abstract, 2019.

6 J. Chen, **J.P. Lalor**, H. Yu. Detecting Hypoglycemia Incidents from Patients' Secure Messages. *American Medical Informatics Association (AMIA) Annual Symposium* Poster, 2018.

5 **J.P. Lalor**, H. Wu, H. Yu. Soft Label Memorization-Generalization for Natural Language Inference. *Workshop on Uncertainty in Deep Learning. Uncertainty in Artificial Intelligence (UAI)* Paper, 2018.

4 **J.P. Lalor**, H. Wu, H. Yu. Modeling Difficulty to Understand Deep Learning Performance. *Northern Lights Deep Learning Workshop (NLDL)* Extended Abstract, 2018.

3 **J.P. Lalor**, H. Wu, H. Yu. CIFT: Crowd-Informed Fine-Tuning to Improve Machine Learning Ability. *Human Computation and Crowdsourcing (HCOMP)* Works-in-Progress, 2017.

2 **J.P. Lalor**, H. Wu, L. Chen, K. Mazor, H. Yu. Generating a Test of Electronic Health Record Narrative Comprehension with Item Response Theory. *American Medical Informatics Association (AMIA) Annual Symposium* Podium Abstract, 2017.

1 T. Munkhdalai, **J.P. Lalor**, H. Yu. Citation Analysis with Neural Attention Models. *LOUHI 2016 : The Seventh International Workshop on Health Text Mining and Information Analysis*, Austin, TX, USA, November 2016.

Tutorials and Invited Talks

09/2019 Learning Latent Parameters Without Human Response Patterns: Item Response Theory with Artificial Crowds. *Notre Dame Department of Computer Science and Engineering Seminar Series.*

11/2018 Evaluation and Interpretability in Deep Neural Networks. *American Medical Informatics Association (AMIA) Annual Symposium* Instructional Workshop, 2018. With A. Jagannatha and H. Yu.

09/2018 Leveraging Uncertainty for Better DNN Training and Evaluation. *UMass Lowell Data Science Lecture Series.*

09/2017 Building Better Evaluations using Item Response Theory. *University of Notre Dame Natural Language Processing Group.*

12/2016 Building Evaluation Scales for NLP using Item Response Theory. *UMass CICS Machine Learning and Friends Lunch series.*

Teaching

University of Notre Dame, Mendoza College of Business

Fall 2019 **Instructor**, *ITAO 40250: Unstructured Data Analytics*, advanced undergraduate.

Fall 2019 **Instructor**, *ITAO 70810: Data Wrangling with R*, M.S. in Business Analytics.

University of Massachusetts Amherst

Fall 2018 **Instructor**, UMass Lowell Data Science Lecture Series, University of Massachusetts Lowell.
Prepared and gave three lectures on evaluation and interpretability in deep neural networks

Fall 2018 **Instructor**, CICS First Year Seminar, University of Massachusetts Amherst.
Seminar for first year students on Artificial Intelligence in Healthcare. I am the sole instructor for this course, and designed the syllabus, lectures, and assignments.

Advising

2018 **Research Mentor**, Long Le, B.S. in Computer Science, University of Massachusetts Amherst.
Project: Analysis of Easy/Difficult Images for CNN Models

2018 **Research Mentor**, UMass CICS Industry Mentor Program.
Project: Analyzing Users within Organizations with NLP

2017-2018 **Research Mentor**, Nikhil Titus, M.S. in Computer Science, University of Massachusetts Amherst.
Project: Neural Question Generation

2015 **Teaching Assistant**, Introduction to Computer Science, Amherst College, Amherst, MA.
Professor: Crystal Valentine
As TA I held weekly office hours, assisted students during weekly lab session, and graded weekly lab programming asssignments. I also prepared and gave two lectures during the semester.

2014 - 2015 **Tutor**, DePaul University.
Tutor for masters and undergraduate students in Computer Science on courses involving Python, SQL, and HTML/CSS

Media Coverage

02/20/2019 VA Research News Briefs, "Educational tool helps patient understand electronic health records." `https://www.research.va.gov/in_brief.cfm`

04/11/2017 NYU Center for Data Science, "Can deep learning models learn like the human brain?" `https://cds.nyu.edu/machine-learning-intelligence/`

Service

2019 **Reviewer**, NAACL, ACL, AMIA, JMIR, CoNLL.

2018 - 2019 **Co-organizer**, UMass CICS Machine Learning and Friends Lunch..

2018 **Reviewer**, American Journal of Preventative Medicine (AJPM), American Medical Informatics Association (AMIA) Annual Symposium, Journal of Medical Internet Research (JMIR).

2017 **Reviewer**, Journal of Medical Internet Research (JMIR).

2014 - 2015 **Graduate Ambassador**, DePaul University.
Spoke with prospective graduate students about DePaul and the MS program.

Honors and Awards

2018 UMass CICS Travel Grant recipient

2015 Graduate with Distinction, DePaul University

2015 Upsilon Pi Epsilon Computer Science Honor Society, DePaul chapter

2011 Cum Laude Graduate, University of Notre Dame

2010, 2011 USA Rugby Midwest Select Side Selection

2008 USA Rugby Under-19s Selection