Duy Duong-Tran

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http://dduongtr.github.io

Vision & Interests

An intrinsically motivated educator with a passion to build a resilient learning environment embracing inclusion, diversity, and equity. As a researcher, I am interested in: **i)** the applied mathematics/Operation research field: **Network Science** with applications in **Network Neuroscience**; **ii)** cross-disciplinary thinking in Engineering Education.

Academic & Research Positions

Assistant Professor, Department of Mathematics, United States Naval Academy — Jan 2023-
Supervised by Prof. Vrej Zarikian

- Concurrently build and improve the newly revamped Data Science Major at the Academy
- Teaching Data Science and Mathematics Courses as assigned by Department of Mathematics
- Lead independent undergraduate research program in network science, network neuroscience.

Post-Doctoral Researcher, Perelman School of Medicine, University of Pennsylvania — May–Nov 2022
PI Prof. Li Shen at Shen Lab

- Explore new dataset in Alzheimer's disease (ADNI 3 Data-set), investigate potential functional and/or structural disruptions of human brain's sub-circuits contributing to disease pathology
- Technical frameworks include Network Morphospace, Topological Data Analysis, Riemann Geometry, and Statistical Process Control.

Doctoral Assistant, School of Industrial Engineering, Purdue University — July 2017– May 2022
PI Prof. Joaquín Goñi at CONNplexity Lab

- Develop frameworks using Random Graphs, Theoretical Morphospace, Topological Data Analysis, Stochastic Processes and Network Inference and Synthesis
- Investigate characteristics of human Brain Structure and Functions in diverse applications, including healthy controls and decease such as Alzheimer's
- Support mentoring and advising activities for master and undergraduate students in CONN*plexity* lab.
- Collaborate with other researchers and PhD students on research projects as needed.

Graduate Research Intern, Data Science Institute, Lawrence Livermore National Lab — June–Oct 2020
Supervised by Dr. Alan David Kaplan

- Joint appointment with the Computational Engineering Division (CED)
- Leveraging different recovery criteria in Stochastic Block Models, *a priori* set of well-defined mesoscopic structures are used as benchmarks to obtain meaningful functional connectivity patterns for human brain across different Schaefer parcellation granularity levels.
- This is the extension of the 2019 project.

Graduate Research Intern, Data Science Institute, Lawrence Livermore National Lab — June–Sept 2019
Co-supervised by Dr. Alan David Kaplan and Dr. José Cadena-Pico

- Joint appointment with the Machine Learning Group
- Using recent developments in detectability limits in theoretical Stochastic block model research to create an information theoretic framework to access the level of prominence of *a priori* set of functional networks in a functional connectome.

Graduate Assistant, IEE & EM, Western Michigan University (WMU) — Jan 2015– May 2019
Co-supervised by Prof. Lee J Wells and Prof. Steven Butt (Dean - College of Engineering)

- Revisit classical Shewhart's and Robert's Exponentially Weighted Moving Average (EWMA) scheme to redesign the *One-sided* EWMA control charts
- Exploring various methods on statistical process control to high-density data cloud.

EDUCATION

Ph.D. Industrial Engineering, Purdue University, PI: Joaquín Goñi	May 2022
M.S. Industrial Engineering, Western Michigan University	May 2017
B.S. Industrial Engineering, Western Michigan University	Dec 2014
B.S. Mathematics, Western Michigan University	Dec 2014

HONORS FELLOWSHIPS SCHOLARSHIPS

[19]. **2021** Recipient of the **Purdue College of Engineering Bilsland Dissertation Fellowship**, West Lafayette, IN (Award Amount: $ 35,000 for 2 terms: Summer 2021 and Fall 2021 semester);

[18]. 2019 Enlisted member of Purdue Institute of Integrative Neuroscience (PIIN) - Purdue University, West Lafayette, IN;

[17]. 2019 Recipient of the **Estus H. and Vashti L. Magoon Excellence for Teaching Award**, College of Engineering, Purdue University (Award Amount: $ 2,000);

[16]. 2019 Travel Grant Award from Purdue School of IE for 2019 NetSci Conference, Vermont, U.S. (Amount: $ 400);

[15]. 2018 Big-Data Neuroscience Conference Travel Scholarship hosted by Indiana University;

[14]. 2017 Ross Doctorate Research Fellowship Recipient, Purdue College of Engineering, Purdue University (Award Amount: $ 55,000 per year for 4 years);

[13]. 2017 Outstanding Graduate Student Award - Department of Industrial & Entrepreneurial Engineering and Engineering Management - WMU;

[12]. 2017 Final 15 in the three-minutes Graduate Talk Competition hosted by the Graduate thesis Competition (Fall semester), WMU;

[11]. 2014-2015 Kellogg's Industrial Engineering Scholarship - Floyd College of Engineering & Applied Science, WMU;

[10]. 2014 Top 5 Undergraduate Seniors in IE undergraduate program, WMU College of Engineering;

[9]. 2014 WMU College of Engineering and Applied Science Dean List;

[8]. 2013 Member of Alpha Pi Mu - Honored Society for Industrial Engineering - WMU Chapter;

[7]. 2013 Member of Pi Mu Epsilon – Honored Society of Mathematics – WMU Chapter;

[6]. 2013 Fred E. Beeler Memorial Mathematics Scholarship – Dept. of Mathematics, WMU;

[5]. 2012 Grand Rapids College Innovation Challenge Competition - **2nd** place Award: Solution for Campus Parking Capacity in Downtown Grand Rapids using applied mathematics;

[4]. 2012 Theodora Quick Mathematics Scholarship, offered by Department of Mathematics;

[3]. 2011 Lower Michigan Mathematics Competition (LMMC) competed as the only two-year institution and ranked in the top ten (8^{th} out of 30 other four-year institutions in Michigan)

[2]. 2011 Member of Student Math League (SML) Competition hosted by the American Mathematical Association of Two-year Colleges (AMATYC) with final result in 2^{nd} Place.

[1]. 2009-2010 Selected as a member of Southern Vietnam Olympiad Team in *10th* and *11th* grade.

PUBLICATIONS

[6] Abbas, K., Wang, M., **Duong-Tran, D.**, Liu, M., Tipnis, U., Shen, L., Kaplan, A., Harezlak, J., Goñni, J. (**2021**) "Tangent space projections of optimally regularized Functional Connectomes improve their phenotypic reliability as measured by their fingerprint." (*Published in Journal of Computational Neuroscience*)

[5] Duong-Tran, D., Dastoorian, R., Wells, L. (**2021**) "Revisiting the One-sided Exponentially-weighted moving average control chart design." http://www.journal-aprie.com/article_141220.html (*Published in Journal of Applied Research in Industrial Engineering*)

[4] Chiem, B., Abbas, K., Amico, E., **Duong-Tran, D.**, Crevecoeur, F., Delvenne, J.-C., Goñni, J. (**2021**) "Improving Functional Connectomes Fingerprinting with Degree-Normalization." https://doi.org/10.1089/brain.2020.0968 (*Published in Brain Connectivity Journal*)

[3] Duong-Tran, D., , Abbas, K.,Amico, E., Corominas-Murtra, B., Dzemidzic, M., Kareken, D., Ventresca, M., & Goñni, J. (**2021**). "A morphospace of functional configuration to assess configural breadth based on brain functional networks". Network Neuroscience, 5(3), 666–688. https://doi.org/10.1162/netn_a_00193 (*Published in Network Neuroscience Journal, MIT Press* - **Methods Section**)

[2] Amico, E., Kausar, A., **Duong-Tran, D.**, Uttara, T., Meenusree, R., Evgeny, C., Ventresca, M., Jaroslaw Harezlak, and Goñni, J. (**2021**) "Towards an information theoretical description of communication in brain networks." https://doi.org/10.1162/netn_a_00185 (*Published in Network Neuroscience Journal, MIT Press* - **Methods Section**)

[1] Abbas, K., Amico, E., Svaldi, D.O., Tipnis, U., **Duong-Tran, D.**, Liu, M., Rajapandian, M., Harezlak, J., Ances, B.M. and Goñni, J. (**2020**) GEFF: Graph embedding for functional fingerprinting. https://doi.org/10.1016/j.neuroimage.2020.117181 (*Published in NeuroImage Journal, 221, p.117181*)

Thesis & Dissertation

[2] Duong-Tran, D., (**2022**) "On geometrical and algebraic properties of human brain functional networks." (*PhD Dissertation*)

[1] Duong-Tran, D., (**2017**) "Revisiting the One-sided Exponentially Weighted Moving Average Control Chart Design." (*Master Thesis published in WMU ScholarWorks*)

Working Manuscripts

[2] Duong-Tran, D., Abbas, K., Cadena-Pico, J., Kaplan, A., Goñi, J. "A principled framework to threshold the whole-brain functional connectivity based on stochastic block models." *In-preparation*

[1] Bennette, P., **Duong-Tran, D.** "Generalized Urn's model." *In-preparation*.

Teaching & Mentoring

Purdue University 2018-2022

- IE Stochastic Models
- IE Independent Projects
- IE System Dynamics Modeling for Engineers (Pamplona, Spain)

Western Michigan University 2014-2017

- Simulation
- Statistical Quality Controls
- Design of Experiments for Industrial Engineering
- Engineering Statistics
- Engineering Economy for Mechanical Engineers

Grand Rapids Junior College 2009-2011

- Mathematics: Pre-Calculus up to Linear Algebra, Differential Equations
- Physics: Calculus-based Physics I and II
- Chemistry: Honored Chemistry I and II; Organic Chemistry I and II

Service

Search Committee member, Purdue College of Engineer IE Head Search Early 2021

- Iteratively improve search documents such as internal school-wise survey for IE Head qualifications/visions, candidate interview evaluation criteria
- Review and make recommended edits for the IE Head Posting Description and Points of Pride Documents

- Maintain confidentiality for all search communication and documentation; nominate up to three candidates to search consultants for outreach

Chair of Health and Wellness, Purdue IE Graduate Student Organization Mar 2019

- Foster interactions and awareness on healthy and sustainable environment for research in IE graduate student body; provide leadership on the development of special programs to support work-life balance and alleviate work-induced stresses
- Provide ongoing support to prospective graduate students joining Purdue IE Graduate programs in the academic years of 2019-2020 and 2020-2021

Invited Talks

[11] An introduction to Topological Data Analysis: a crossroad between graph theory and topology - Venue: Department of Mathematics, Western Michigan University | Kalamazoo, Michigan | 09/30/2021

[10] Can AI learn from hum brain and vice versa? (Link: https://youtu.be/2I9fozYUL9Q) - Venue: Residents & Fsoft Artificial Intelligence Department, FPT Software Company | Saigon, Vietnam | 06/09/2021

[9] From Individual Fingerprints to topological morphospace and beyond - Venue: Industrial and Entrepreneurial Engineering, Western Michigan University | Kalamazoo, Michigan | 04/2019

[8] Subject Identifiability Study on Stages of Consciousness using fMRI data - Venue: Mediterranean Complex Network School | Sicily, Silina, Italy | 09/2018

[7] A morphospace framework to quantify functional flexibility (one-short talk) - Venue: Mediterranean Complex Network School | Sicily, Silina, Italy | 09/2018

[6] From Graph Automorphism to Network Alignment - Venue: Western Michigan University | Graph Theory Seminar | 10/07/2017

[5] The Preferential Attachment Model (joint talk with Prof. Patrick Bennette) - Venue: Western Michigan University | Graph Theory Seminar | 04/07/2017

[4] Community Structure in Networks (Link: https://youtu.be/DPJkU2coVkQ) - Venue: Grand Rapids College | Mathematics Department | 04/05/2017

[3] Introduction to Spectral Graph Theory - Venue: Western Michigan University | Graph Theory Seminar | 02/03/2017

[2] Significance of Statistical process control design robustness in high-volume low mix data environment (Link: https://youtu.be/9ZwidYK_cNU)- Venue: Grand Rapids College Mathematics Department | 01/27/2016

[1] Mathematical Applications in Industrial Engineering World - Venue: Grand Rapids College | Mathematics Department | 09/22/2014.

Conference Abstract & Presentations

[10] Abbas, K., Wang, M., **Duong-Tran, D.**, Liu, M., Tipnis, U., Shen, L., Kaplan, A., Harezlak, J., and Goñi, J. "Tangent space projections of Functional Connectomes improve their phenotypic reliability as measured by their fingerprint gradient." Submitted to **Congress of Neurological Surgeons Conference 2021, Austin, TX, USA.**

[9] Abbas, K., Wang, M., **Duong-Tran, D.**, Liu, M., Tipnis, U., Shen, L., Kaplan, A., Harezlak, J., and Goñi, J. Tangent space projections of Functional Connectomes improve their phenotypic reliability as measured by their fingerprint gradient, *Accepted to Poster Session* - **2021 NetSci Conference - Network Neuroscience Satellite**, hosted virtually by Indiana University.

[8] Duong-Tran, D., Abbas, K., Cadena-Pico, J., Kaplan, A., Goñi, J. A principled framework for estimating whole-brain functional connectivity based on functional networks, *Accepted to Poster Session* **2021 NetSci Conference - Network Neuroscience Satellite**, hosted virtually by Indiana University.

[7] Duong-Tran, D., Amico, E., Corominas-Murtra, Abbas, K., Dzemidzic, M., Kareken, D., B., Ventresca, M., and Goñi, J., A morphospace framework to quantify configural breadth based on brain functional networks, *Accepted in* Clinical and Translational Sciences Institute (CTSI) 2020 at Purdue University.

[6] Abbas, K., Amico, E., Svaldi, D., Tipnis, U., **Duong-Tran, D.**, Harezlak, J., and Goñi, J., Multidimensional framework based on functional connectivity traits for task independent individual fingerprinting,

Accepted to Poster Session - **Netsci Conference, Vermont, U.S.A., 2019**.

[5] Amico, E., Abbas, K., **Duong-Tran, D.**, Tipnis, U., Rajapandian, M., Ventresca, M., Harezlak, J., and Goñi, J., Towards a mathematical theory of communication in human brain networks, *Accepted to Poster Session* - **Netsci Conference, Vermont, U.S.A., 2019**.

[4] Duong-Tran, D., Amico, E., Corominas-Murtra, B., Dzemidzic, M., Kareken, D., Ventresca, M., Goñi, J., A morphospace framework to quantify flexibility of functional networks, *Accepted to Poster Session* - **NetSci Conference, Vermont, U.S.A., 2019**.

[3] Abbas, K., Amico, E., Svaldi, D., Tipnis, U., **Duong-Tran**, D., Harezlak, J., Goñi, J., Task Identification based on Functional Connectomes, *Accepted in* **Organization of Human Brain Mapping, Rome, Italy, 2019**.

[2] Duong-Tran, D., Amico, E., Corominas-Murtra, B., Ventresca, M., Goñi, J., A morphospace framework to quantify functional flexibility, accepted in **Mediterranean School of Complex Network Summer School, Silina, Italy, 2018**.

[1] Amico, E., **Duong-Tran, D.**, Uttara, T., Rajapandian, M., Ventresca, M., Jaroslav, H., Goñi, J., Towards a mathematical theory of communication in human connectome, accepted to **NetSci Conference, Paris, France, 2018**.

Industry Positions

Internal Sales and Program Manager, Mann+Hummel USA 03/2015–02/2016

Supervised by Ryo Kawabata

- **Cross-functional program management (PM):** lead global multi-disciplinary internal program team to shape customer's expectations through optimal tier-n sourcing analysis, optimal manufacturing footprint, piece price analysis, project finance
- **Leadership:** provide corporate Mann+Hummel Board of Directors (US and Germany) with updates on engineering design evolution, sourcing decisions, budget and financial performance through PM system
- Liaise with Original Equipment Manufacturer (OEM) on technical/commercial on-going program challenges
- **OEM Accounts:** Nissan, Toyota, General Motor (GM); **Program Budget Range:** $ 100,000 to $ 300,000.

Corporate Planning Engineer, Denso Manufactruring Michigan Incorporate 03/2014–02/2015

Supervised by Mary Zesiger

- Create and manage the multi-commodity capacity management access database constituted by the new capacity management methodology
- Facilitate weekly cross-functional conferences with Process Engineering group leaders to accommodate the manufacturing constraints, capital budgeting conditions and upcoming milestones
- Investigate risk level related to footprint and capacity management projects (production transfer, uncertainty in forecasting activities).

IE Co-Op, Mann+Hummel USA 03/2014–02/2015

Supervised by Adam Stemaly

- **Build** an VBA-based database with end-user-interface application for engineering resource planning
- **Coordinate** engineering communications between Project Engineering, Sales/Program Management and Operation/Manufacturing groups
- **Provide** updates for engineering managers and directors with future outlook and constraints based on engineering and sales forecast.

Pharmacy Technician Level 1, Meijer Inc. 04–09/2011

Supervised by Charlie Mollien

- **Provide** immediate consultation to walk-in customers for over-the-counter drugs
- **Complete** the fillings of non-classified prescriptions and provide on-going support to on-shift pharmacists and other senior pharmacy technicians.

LANGUAGES **Machine:** *i) Scripting:* MatLab (Proficient), Python (Intermediate); *ii) Programming:* Javascript (Beginner), CSS (Beginner), HTML (Beginner)
Human: Vietnamese (Native); English (Bilingual Proficiency).

SOFTWARE **Statistics:** StatFit, MiniTab, Crystal-ball extension (Excel);
Optimization Solvers: Lindo, LINGO;
Terminal Interface: bash, parallel computing, slurm system commands, computing nodes/clusters;
Simulation Software: Arena, Vensim;
Network Science/Graph theory: Cytoscape, Ipe;
Image Editor: Inkscape (beginner), Gimp (Proficient)
Others: $LATEX$, Office Suites; **OS:** Mac (Proficient), Linux (Beginner)
Supported teaching Platforms/Software: E-learning, Brightspace, Gradescope, Kahoot.

OTHER VOLUNTEER/ TRAINING **[6].** Machine Learning using MatLab Training by Purdue Professional Development (04/21/2021)
[5]. Certificate of **18 training hours** on Complex Networks (School: **V** (*the fifth*) Mediterranean School of Complex Networks, Sicily, Italy, **2018**)
[4]. Fundamental Engineering (FE) Certificate (Issued: **2014**)
[3]. Member of Institute of Industrial Engineering (IIE) – Great Lake Chapter
[2]. Volunteer: Meijer Michigan States Game Volunteer/Participant, America Transplant Game
[1]. Sport highlights: 2018 Michigan State Games Gold, 2017 State Games of America Bronze Medal.

NEWS COVERAGE **[7].** https://bit.ly/2RYSPgC (Dan Viet Newspaper, in Vietnamese).
[6]. https://bit.ly/3knOWh7 (Ross Doctorate Fellowship)
[5]. https://bit.ly/3BcGfMr (Mediterranean School of Complex Networks)
[4]. https://bit.ly/3wMHYEX (NetSci 2019 Poster Presentation)
[3]. https://bit.ly/3esv4pc (Livermore Summer Associate Position)
[2]. https://bit.ly/3wKSLPV (Magoon Teaching Excellence Award)
[1]. https://bit.ly/3eoHs9S (Pamplona, Spain Maymester - Purdue Global Engineering Engagement).