Diego Castro Estrada

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Education

B.S in Computer Science and Math, *Florida International University* (08/2019 – 12/2023)

* Relevant Coursework: Real Analysis I and II, Mathematical Statistics, Machine Learning, Theory of Algorithms, Natural Language Processing, Mathematical Modelling, Numerical Analysis.
* Cumulative GPA is 3.79/4.0

Experience

Undergraduate Researcher, *Cognac Lab FIU* (02/2020 – 12/2023)

* Worked on projects organized under SocialSim, a DARPA-funded initiative with the goal of providing high-fildelity simulations of online behavior in order to analyze and counter hostile narratives.
  - Participated in the creation of the GOLEM corpus, a dataset of ∼25K news articles annotated for motif analysis in narratives. Work published at LREC-Coling 2024.
  - Evaluated performance of Large Language Models at identifying unknown motifs in text to establish it as a challenging task for current SOTA methods.
  - Gathered data involving motif usage in Irish sport broadcasts in order to evaluate the incidence of motific events in in-group-affirming situations.
  - Worked on the creation of an NLP pipeline to automatically identify in-culture associations of a given (previously unknown) motif.
  - Collaborated on the design and ran experiment to quantify the ability of motifs to influence understanding of information of in-culture individuals. Work pending submission to *Journal of Memory and Language*.
  - Collaborated on the design and ran experiment to quantify the ability of out-culture individuals to identify unknown motific instances. Work pending submission to *Journal of Memory and Language*.

Resident Assitant, *Housing and Residential Experience FIU* (08/2023 – 12/2023)

* Jointly supervised all residents of Everglades Hall and was directly responsible for over 30 residents on the building's 4^{th} floor.
  - Mediated roommate conflicts, achieving satisfactory solutions for all parties and maintained close relationships with residents, fostering a sense of community.
  - Organized events servicing the entirety of the university's housing community.

Summer Researcher, *AMRPU FIU* (06/2023 – 08/2023)

* Discovered several novel ways of decomposing Riemannian submersions where the base manifold is locally-product-Riemannian into disjoint parts.
  - Established conditions for several properties of the resulting distributions including integrability, pluriharmonicity and total-geodesicity involving O'Neill tensors.
  - Work was presented at AMRPU conference.

Summer Researcher, *LIDS Lab MIT* (06/2021 – 12/2021)

* Worked on the development of a mathematical framework for transfer learning with the preservation of constraints under the supervision of Drs. Asuman Ozdaglar and Alireza Fallah.
  - Designed test for empirical evaluation of potential training methods for constrained transfer learning.
  - Explored minimax formulation using constraint functions.
  - Presented poster at MSRP conference.

Publications

1. Acharya A., **D. Castro Estrada**, S. Dahal, W.H. Yarlott, D. Gomez, and M.A. Finlayson. 2024. "Discovering Implicit Associations of Cultural Motifs from Text." Sixth Workshop on NLP and Computational Social Science (NLP+CSS), 2024 Annual Conference of the North American Chapter of the Association for Computational Linguistics (NAACL 2024). Mexico City, Mexico. PNNL-SA-193395.
2. Yarlott, W.V.H., A. Acharya, **D. Castro-Estrada**, D. Gomez, and M.A. Finlayson. 2024. "GOLEM: GOld standard for Learning and Evaluation of Motifs." The 2024 Joint International Conference on Computational Linguistics, Language Resources and Evaluation (COLING-LREC). Torino, Italy.
3. Yarlott, W.V.H., A. Ochoa, A. Acharya, L. Bobrow, **D. Castro-Estrada**, D. Gomez, J. Zheng, D. McDonald, C. Miller, and M.A. Finlayson. 2021. "Finding Trolls Under Bridges: Preliminary Work on a Motif Detector." Advances in Cognitive Systems. Virtual Conference
4. Yarlott, W.V.H., A. Ochoa, A. Acharya, L. Bobrow, **D. Castro-Estrada**, D. Gomez, J. Zheng, D. McDonald, C. Miller, and M.A. Finlayson. 2021. "AI models for detecting motifs in a text collection" Literature & Culture and/as Intelligent Systems. Stuttgart, Germany.

Projects

Pointwise Bi-Slant Riemannian Subersions

* Presented work done at FIU's Applied Mathematics Research Program for Undergraduates. Our project explored the properties of Pointwise Bi-Slant Riemannian Submersions (PBSRSs). We discovered several novel ways to factor the PBSRSs into vertical and horizontal components. We also outline the conditions under which such distributions are totally-geodesic, integrable, and pluriharmonic.

Information Theoretic Inequality Prover

* Worked on the design and development of a system using a modified version of Fourier-Motzkin elimination to automatically and accurately determine the validity of inequalities involving random variables and information theoretic functions of random variables.

Awards, Scholarships and Leadership

Awarded the FIU Presidential Scholarship.
Former President and former VP of the FIU Math Club.
FIU Outstanding Academic Achievement Award.

Dean's List Fall 2019, Spring 2020, Fall 2020, Spring 2021, Fall 2021, Spring 2022
Honors College Dean's List Spring 2020, Fall 2020, Spring 2021, Fall 2021, Spring 2022.

Relevant Skills

Experienced in Python. Proficient at C and Java.

Fluent in English and Spanish. Speaks basic (A2) German.

Proficient at using well-known techniques to construct mathematical models of real-world phenomena.

Experienced at using HPC clusters to train machine learning models.

Experienced at designing, training and deploying machine learning models.

Experienced at learning complex concepts efficiently in order to adapt to changing responsibilities.

Experienced at analyzing unstructured text for narrative information.