

# MAURICIO TEC

## Research Scientist

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## EXPERIENCE

### Research Intern

Intel AI - Movidius

Summer 2019

Movidius provides solutions for deploying vision algorithms at ultra-low power

Investigated the resilience of image-recognition neural networks in mission-critical scenarios. Detected vulnerabilities and characterized failures with respect to bit errors—common in hardware accelerators. Developed a small-overhead mitigation strategy. Coded in Python. Research paper coming soon.

### Graduate Research Assistant

The University of Texas at Austin

2018 – 2019

Large-scale spatiotemporal density smoothing (with Prof. James G. Scott)

Developed a fast parallel ADMM algorithm for smoothing along the edges of a general graph with noisy and sparse data at each vertex. Coded in Julia and tested on a Linux supercomputer with attention to memory efficiency and parallelism at all level (distributed, multithreaded and vectorized). Applied the method to ride-sharing data in a case study to detect spatiotemporal effects in driver productivity.

endingglobalhunger.org (with Prof. Kate Weaver)

Created a web app and a Python toolkit with scrapers and content analysis tools for tracking vote information and news from Members of Congress on Food Security policy issues.

### Data Scientist

CIBanco

2016 – 2017

Financial group that offers portfolio management, and brokerage services

Developed an in-house portfolio optimization toolkit using R and C++ used for successful mid-term investment strategies. Implemented a data warehouse and a wide range of reporting tools using SQL, R, and Shiny.

## OTHER RESEARCH PROJECTS

### Variational Models for Commonsense Knowledge Extraction

with Prof. James G. Scott, Jason Balridge, Jeremiah Liu and Deepak Ravichandran

Collaborating with Google AI researchers to develop a novel framework to mitigate the noise problems in extracting information of commonsense knowledge of quantitative attributes from text corpora. We are developing robust graph smoothing and variational Bayesian neural network techniques that leverage language models and word embeddings to produce denoised correlation-aware and semantic-aware resources; thus, enabling a pipeline for the automatic construction of high-quality quantitative attributes in knowledge bases that is robust to noise in web text corpora.

### MCTS + Deep Learning for Textworld Competition

with Prof. Stephen Walker

Designed a reinforcement learning agent that uses Monte Carlo Tree Search guided by a memory transformer-based neural network to learn to play the game TextWorld. Participated in the competition ending in 10th place. Python code: [github.com/mauriciogtec/Neural-MCTS-TextWorld](https://github.com/mauriciogtec/Neural-MCTS-TextWorld).

### Random Clique Covers

with Prof. Sinead Williamson

Proposed Random Network models based on clique covers that match the local clustering coefficient and sparsity of real-world networks, outperforming state-of-the-art models for sparse networks in Bayesian frameworks.

## EDUCATION

### Ph.D. in Machine Learning

The University of Texas at Austin, USA  
Department of Statistics & Data Science

2017 to date

GPA: 4.0

Advisor: James G. Scott

### M.Sc. in Mathematics

University of Cambridge, UK

2014 – 2015

Cambridge Trust Scholarship (full funding)  
SEP Scholarship (4k USD stipend)

### B.Sc. Applied Mathematics

ITAM, Mexico

2007 – 2012

Bailleres Scholarship (full funding)

### Exchange student

Universite Paris Dauphine, France

2011-2012

Masters (M1) Applied Mathematics  
All courses in French

## SKILLS

### Computing

Python    R    Julia    C++

Parallel Computing    Linux

### Statistics / Machine Learning

Deep Learning

Natural Language Processing

Reinforcement Learning

Graph Algorithms

Bayesian Machine Learning

## LANGUAGES

- English (fluent)
- Spanish (fluent)
- French (advanced)
- German (beginner)

## PUBLICATIONS

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### Journal Articles

- Zuniga-Garcia, Natalia, Mauricio Tec, James G. Scott, Natalia Ruiz-Juri, and Randy Machemehl (2019). "Evaluation of Ride-Sourcing Search Frictions and Driver Productivity: A Spatial Denoising Approach". In: *Transportation Research Part C*.

### Conference Proceedings

- Williamson, Sinead and Mauricio Tec (2019). "Random clique covers for graphs with local density and global sparsity". In: *UAI*.
- Zuniga-Garcia, Natalia, Mauricio Tec, James G. Scott, Natalia Ruiz-Juri, and Randy Machemehl (2018). "Evaluation of Ride-Sourcing Search Frictions and Driver Productivity: A Spatial Denoising Approach". In: *INFORMS*.

### Preprints


- Tec, Mauricio, James G. Scott, and Natalia Zuniga-Garcia (2019). *Large-Scale Spatiotemporal Density Smoothing with the Graph-fused Elastic Net: Application to Ride-sourcing Driver Productivity Analysis*. URL: <https://github.com/mauriciogtec/RideAustinSpatioTemporalDensitySmoothing>.

## TEACHING

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### Teaching Assistant


[The University of Texas at Austin](#)

 2017 – 2019

- Biostatistics
- International Economics with Python
- Data Analysis for Health Sciences

### Lecturer

[Instituto Tecnológico Autónomo de México](#)


 2015 – 2017

- Multivariate Statistics
- Markov Decision Processes
- Computational Statistics
- Stochastic Processes
- Numerical Analysis
- Quantitative Methods for Finance

## REFEREES


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### Prof. James G. Scott

 The University of Texas at Austin  
Department of Statistics


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### Prof. Stephen G. Walker

 The University of Texas at Austin  
Department of Statistics

 [s.g.walker@math.utexas.edu](mailto:s.g.walker@math.utexas.edu)

### Prof. Beatriz Rumbos

 Instituto Tecnológico Autónomo de México (ITAM)  
Department of Mathematics

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## ORGANIZATIONAL

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### Student Liaison

[The University of Texas at Austin](#)

 2019 to date

Graduate student host of the seminar speakers at the Department of Statistics and Data Science.

### GSA Representative

[The University of Texas at Austin](#)

 2017 – 2018

Representative of the students of the Department of Statistics at the Graduate Student Assembly (GSA) of the University of Texas.

### Communication Officer

[The University of Cambridge](#)

 2015

Co-organizer of the 50th Wolfson College Research Event at the University of Cambridge.