Julio Cesar Enciso-Alva

Applied Mathematician & Data Scientist

Arlington, TX, ZIP 76013
juliocesar.encisoalva@uta.edu
+1 817 405 8335
/julio-enciso-alva/
encisoalva.github.io

EXECUTIVE SUMMARY

Being a certified Applied Mathematician I am qualified to analyze, implement, and develop algorithms for specific purposes: visualization, analysis, modeling, prediction, decision making.

My definition of success is the practical capacity to help others, including but not limited to inclusion and diversity.

KEY SKILLS

- Data analytics, math/statistical modeling, machine learning.
- Object oriented programming, data management.
- Interdisciplinary research, report generation, problem solving.
- People management, project development and deployment.
- Teaching and mentoring, diversity in higher education.
- Graphic design, publication-quality and educational purposes.
- **Programming:** Matlab, Python, R, C++, MySQL, Mathematica.
- **Software:** GNU Linux, MS Office, Tableau, Git, Jupyter, LaTeX, ggplot2, GeoGebra.
- **Libraries:** Sci-kit, PyTorch, Tensorflow, CUDA, Shiny (R), Sage.

EDUCATION

- [2024] **PhD. in General Mathematics**
  - University of Texas at Arlington.
  - Arlington, Texas, USA.
  - Thesis: New Methods in EEG Source Localization based on EEG and Post-Mortem Pathology Data.
  - [2019-2024] Graduate Teaching Assistant.
  - [2024] Graduate Dissertation Fellowship.
  - [2023] Outstanding Graduate Student Researcher.
- [2023] **M.Sc. in General Mathematics**
  - University of Texas at Arlington.
  - Arlington, Texas, USA.
  - Degree awarded for credit completion.
- [2017] **B.S. in Applied Mathematics with minor in Biology**
  - Universidad Autonoma del Estado de Hidalgo.
  - Pachuca, Hidalgo, Mexico.
  - Thesis: Weak Stationarity in Polysomnography Recordings of Older Adults as a Marker for Mild Cognitive Impairment.

COURSES TAUGHT

- [Fall 2019] MATH 1301 Contemporary Mathematics.
  - Instructor of Record. 2 sections, 101 students.
- [Sum 2020] MATH 1421 Preparation for Calculus.
  - Lab Instructor. 1 section, 35 students.
- [Fall 2020] MATH 1301 Contemporary Mathematics.
  - Instructor of Record. 2 sections, 95 students.
- [Sum 2021] MATH 1301 Contemporary Mathematics.
  - Instructor of Record. 1 section, 8 students.
- [Fall 2021] MATH 1301 Contemporary Mathematics.
  - Instructor of Record. 2 sections, 93 students.
- [Spr 2022] MATH 1315 College Algebra for Economics and Business.
  - Instructor of Record. 1 section, 52 students.
- [Sum 2022] MATH 1316 Calculus for Economics and Business.
  - Instructor of Record. 1 section, 52 students.
- [Fall 2022] MATH 1421 Preparation for Calculus.
  - Instructor of Record. 2 sections, 59 students.
- [Sum 2023] MATH 1316 Calculus for Economics and Business.
  - Instructor of Record. 1 section, 13 students.
- [Fall 2023] MATH 1316 Calculus for Economics and Business.
  - Instructor of Record. 1 section, 64 students.

* Number of students corresponds to the rooster at time of Final Exam.

LEADERSHIP AND MENTORING

- Society for Industrial and Applied Mathematics (SIAM), Graduate Student Chapter at UT Arlington.
  - [2021-2022] President.
  - [2020-2021] Vice-President.
  - Managed an established bi-weekly seminar with an average attendance of 12 graduate students.
  - Initiated *Mathposium Fair*, a department-wide research symposium for graduate students. Estimated attendance was 70 people in 2022 and 120 people in 2023.
- Graduate Peer Mentor.
  - Supervised integration of mentees into the PhD program.
  - Trained mentees for Preliminary Exams in Analysis and Linear Algebra.
  - List of mentees:
    - Olusola Dehinsilu.
    - Enoch Jesse Dangbe.
    - Emran Hossen.
- REU co-mentor.
  - Supervised a small group of community college students performing research.
  - Trained mentees in Matlab programming and algorithm development.
  - Research topic: Measuring coherence of EEG recordings during a cognitive task.

RESEARCH PROJECTS

Electrical Source Imaging (ESI) is a technique used to locate neural sources of electrical activity inside the brain, which may be related to normal or pathological states. Applications of ESI include Neuropsychology and non-invasive monitoring of Epileptogenesis, among others.

The mathematical formulation of this task includes solving the system $AX + \varepsilon = Y$ for X, with Y given and A an $m \times n$ matrix with $m \ll n$. Effective solution of this problem requires Convex Optimization, either smooth or non-smooth, as well as modeling prior functional and anatomical information.

- Non-invasive monitoring of ictal activity in infants.
  - Using ESI from EEG data, the activity from certain brain areas during ictal activity was explored.
  - Subjects were infants with Glut1 deficiency.
- Evaluation of multi-modal ESI methods from EEG.
  - ESI methods were modified to include information from fMRI to increase accuracy.
- Validation of ESI methods from ECoG in animal models.
  - ESI results were compared with measurements from electrodes inserted in the brain.
- Retrospective monitoring of stroke in animal models.
  - Using ESI, the degradation of brain electrical activity due to an induced stroke was explored.
- Evaluation of Virtual Deep Electrodes from ESI data.
  - ESI data was used to estimate the measurements from hypothetical electrodes inserted inside the brain, referred to as Virtual Electrodes.
  - Virtual Electrodes were compared with recordings from electrodes inserted in the brain.
- Novel ESI methods from Dura Imaging and Neural Networks.
  - Dura Imaging (DI) estimates the electric potential through the dura before reaching the scalp electrodes.
  - DI was used as intermediary for ESI with the aid of artificial neural networks.

PRESENTATIONS (SELECTED)

- [Jan 2024] Joint Mathematics Meetings (JMM).
  - San Franciso, CA.
  - [Talk] New Methods in EEG Source Localization based on EEG and Post-Mortem Pathology Data.
- [Nov 2023] Mathposium Fair, UT Arlington.
  - Arlington, TX.
  - [Poster] New Methods in EEG Source Localization based on EEG and Post-Mortem Pathology Data.
- [Jun 2023] AIMS Conference on Dynamical Systems, Diff. Equations, and Applications.
  - Wilmington, NC.
  - [Poster] Evaluation of Methods for fMRI-Informed Electrical Source Reconstruction from EEG.
- [Jan 2023] Joint Mathematics Meetings (JMM).
  - Boston, MA.
  - [Talk] Evaluation of Methods for fMRI-Informed Electrical Source Reconstruction from EEG.

* These presentations were possible thanks to awarded travel fundings.

PUBLICATIONS

- Enciso-Alva JC, Dobariya A, Johnson TE, Mickey B, Pascual JM, Su J.
  (in review). A Robust ECoG Source Localization Method Using Brain Data Analytics Validated by Pig Intracerebral Recordings.
  NeuroImage.
- Rajasekaran K, Ma Q, Good LB, Kathote G, Jakkamsetti V, Liu P, Avila A, Enciso-Alva JC, Markussen KH, Marin-Valencia I, Sirsi D, Hacker PMS, Gentry MS, Su J, Lu H, Pascual, JM.
  (2022). Metabolic modulation of synaptic failure and thalamocortical hypersynchronization with preserved consciousness in Glut1 deficiency.
  Science Translational Medicine, 14(665), eabn2956. DOI: 10.1126/scitranslmed.abn295
- Rosales-Lagarde A, Rodriguez-Torres EE, Itzá-Ortiz BA, Miramontes P, Vázquez-Tagle G, Enciso-Alva JC, García-Muñoz V, Cubero-Rego L, Pineda-Sánchez JE, Martínez-Alcalá CI, Lopez-Noguerola JS.
  (2018). The Color of Noise and Weak Stationarity at the NREM to REM Sleep Transition in Mild Cognitive Impaired Subjects.
  Frontiers in Psychology, 9, 1205. DOI: 10.3389/fpsyg.2018.01205

PROFESSIONAL AFFILIATIONS

- SIAM, Society for Industrial and Applied Mathematics.
- AMS, American Mathematical Society.
- MAA, Mathematical Association of America.
- SACNAS, Society for the Advancement of Chicanos and Native Americans in Sciences.

LINK DUMP

- Personal site   encisoalva.github.io/
- LinkedIn   www.linkedin.com/in/julio-enciso-alva/
- GitHub   github.com/EncisoAlva
- ORCiD   orcid.org/0000-0002-8315-6849
- G. Scholar   scholar.google.com/citations?hl=en&user=qqw6kegAAAAJ