

Ambrosio Valencia-Romero

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Programming experience

Python (+6 years)

- Decision algorithms, discrete event simulation, and object-oriented programming
 - Multi-agent system modeling of collective decision-making processes (https://gitlab.code-lab.org/AmVRo/eager_ma_model)
 - Simulation annealing agents and metaheuristics for multidisciplinary optimization (algorithms 1 and 2 in chapter 6 of [doctoral dissertation](#))
 - Class programming of disciplinary design agents, design tasks, and decision spaces ([IDETC/CIE article](#))
 - Queuing simulation models using event-scheduling and process interaction worldviews
 - Implementation of batch simulation executions and Monte Carlo experiments
 - Discrete event modeling and simulation with SimPy.
- Implementation of quantitative economics and game-theoretical methods
 - Modeling of n -player m -strategy ($n \times m$) games and characterization of their equilibria
 - Partitioning of n -player 2-strategy ($n \times 2$) games into player-reduced games
 - Methods for the characterization of $n \times 2$ fear and greed strategy dynamics (https://github.com/amvroco/strategy_dynamics/blob/main/strategy_dynamics.py)
- Implementation of DEAP evolutionary algorithms for multidisciplinary optimization
 - Applications to surrogate aircraft design and engine design problems (<https://gitlab.code-lab.org/AmVRo/st-aircraft>)
 - Multidisciplinary tradespace exploration analysis
 - Estimation of Pareto fronts.
- Data analysis and visualization
 - Use of NumPy for numerical analysis and tensor operations
 - Use of SciPy, Pandas, and Scikit-learn for statistical analysis, data manipulation, and classification
 - Use of Matplotlib + LaTeX typesetting and packages for plotting and formatting.

R Language (+5 years)

- Linear and non-linear mixed-effects models
 - Variable transformation and application of one-way and two-way ANOVA with interactions
 - Cumulative link mixed models and application of ANODE for ordinal regression (chapter 4 of [doctoral dissertation](#))
 - Mixed logit estimation by Bayesian methods for discrete choice analysis (chapters 5 and 6 of [master's thesis](#)).
- Cooperative game theory methods
 - Use of CoopGame, GameTheory, and GameTheoryAllocation libraries
 - Solution concepts of cooperative games (chapter 6 of [doctoral dissertation](#)).

Miscellaneous (0–10 years)

- Git (+5 years) software and methods for DevOps and source code management
- NetLogo (+4 years) for agent-based modeling and simulation (co-authored [SERC report](#) and [Design Science article](#)).
- MATLAB (+9 years) for implementation of numerical optimization algorithms, written both from scratch (constrained, quadratic, interior-point) and with the aid of the Optimization Toolbox (fmincon, intlinprog, ga)
- MATLAB (+4 years) for Shapley value-like harmonization of non-cooperative $n \times 2$ strategy dynamics
- LaTeX typesetting (+9 years), PGF/TikZ (+7 years), and Asymptote (+1 year) for vector graphics
- Beginner experience with Java for graphical user interface development (for human subject study, [JMD article](#))
- Beginner experience with TensorFlow for deep learning applications
- Beginner experience with Julia for numerical analysis