

David N. Palacio

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Personal Profile

As a Ph.D. Candidate in Computer Science at The College of William & Mary, my research focuses on the use of causal inference methods to interpret and analyze deep learning code generators. With several years of experience as a software researcher, I have worked on a variety of projects, including the use of genetic algorithms for refactoring automation, the application of information retrieval and deep learning techniques to improve traceability link recovery, and the classification of security issues and requirements using pre-trained models. I completed an internship at CISCO Systems, where I explored the use of vector representation and information theory to understand the relationships between software artifacts. I also completed an internship at Microsoft Corporation, where I proposed an interpretability method to understand neural code models. In addition to my research background, I have several years of experience as a software engineer, primarily working on back-end applications. I am currently seeking opportunities in machine learning, data science, and causal inference research roles concentrated on software engineering.

Education

College of William & Mary (W&M)

Williamsburg, VA

Ph.D. Candidate in Computer Science [GPA:3.75]

Sept 2017 - Current

- Research Assistant in Deep Learning for Software Engineering
- Teacher Assistant for Neural Networks & Deep Learning, Software Engineering, Software Development, Reasoning Under Uncertainty
- **Courses:** Data Analysis and Simulation, Advance Software Engineering, Cybersecurity, Data-driven Security & Privacy

National University of Colombia (UNAL)

Bogota, Colombia

Technische Universität München (TUM)

Munich, Germany

M.Sc. Computer Engineering [GPA:3.85]

2012-2016

- (2015) *Assistantship*: Head TA for Computer Programming Courses at UNAL
- (2014) *Indian Government Scholarship ITEC* for Specialized Training on Desing and Implementation of E-Learning Courses at C-DAC, India
- (2012-2013) *Exchange program for students from the top 1%* at TUM, Germany
- **Courses:** Artificial Intelligence, Machine Learning, Data Mining

National University of Colombia (UNAL)

Bogota, Colombia

B.Sc. Computer Engineering [GPA:3.7]

2007-2011

- Passed with Distinction
- Specialized in Software Construction, Artificial Intelligence, and Genetic Algorithms
- **Courses:** Software Engineering, Evolutionary Computation, and Data Mining

Work Experience

Microsoft Corporation

Seattle, WA

Research Intern

Oct 2021 - Mar 2022

- Collaborated with a four-person team to research and develop an interpretability model to understand and enhance Neural Code Models [to be published 2023].
- Proposed an interpretability tool for a Neural Code Model in a U.S. Patent: *Debugging Tool For Code Generation Neural Language Models (MS 412268-US-NP)*.
- **Technical Skills:** Python with PyTorch, NumPy, Matplotlib, Pandas, Scikit-learn, Ubuntu Linux, Fairseq, Git.
- **Soft Skills:** Teamwork, Time Management, Communication, Presentation skills, Critical Thinking

Cisco Systems

Research Triangle, NC

PhD Intern

May 2020 - Aug 2020

- Designed and implemented a data science pipeline using information theory to interpret ML methods in software traceability [to be published 2023]
- **Technical Skills:** Python, NumPy, PyMC3, Keras, Git tools.
- **Soft Skills:** Inspiring people, Adaptability, Cooperation, Critical Thinking, Verbal communication.

Allianz AMOS SE

Munich, Germany

Intern Software Tester

Apr 2013 - Sep 2013

- Software Testing Internship for the Allianz Virtual Client Quality Assurance project
- Created automatic testing script to integrate functional and non-functional results for virtualized environments; reduced testing time by 8% on the releases
- **Technical Skills:** Automated Testing with Python, Software Testing, Bash Tools.
- **Soft Skills:** Cooperation, Confidence, Communication, Willingness to learn, Diversity awareness.

- (02-12 2016) *KSMTI, Bogotá*:
 - Designed and implemented software architectures for automatic deployment of [marketplaces] that reduces clients' costs by 45%
 - Automated deployment of marketplaces tailored for any type of business; allow users to define their own requirements and automatically generate a stable version of the app [project link]
- (03-12 2015) *Ministry of Education (SED), Bogotá*:
 - Maintained and implemented the software architecture of the academic registration system for all public high-school institutions in Bogota
 - Led the adoption of software practices in the government institution by optimizing 65% of the development process and information systems
- (2012-2014) *ITC Consultores SAS, Bogotá*:
 - Led the research team of 7 computer engineers and programmers to enhance software practices in the company achieving Level 4 according to the CMMI diagnosis
 - Engineered the required architecture for a technology migration that impacts the core system and estimated to help client productivity by 40%
 - Refactor major components augmenting comprehensibility of the system by 60%
 - Built a critical pl/sql back-end module for portfolio operations of the biggest banks in Colombia
- **Technical Skills:** AKKA, Scala, Java, Functional Programming, Git, Reactive Programming, PL/SQL, NoSQL, Parallel Processing, AWS.
- **Soft Skills:** Leadership, Time Management, Communication, Cooperation, Dealing with office politics, Competitiveness, Independence, Planning, Problem-solving, Technology trend awareness.

Software Research Projects

Deep Learning for Software Engineering

Williamsburg, VA

William & Mary, SEMERU Research Group

Feb 2017 - Current

- Using a T5 model to support four code-related task: automatic bug-fixing, generation of assert statements in test methods, code summarization, and injection of code mutants [ICSE'21]
- Proposed a research road-map that delineates the foundations of DL techniques applied to SE research by analyzing the components of learning [TOSEM'22]
- Implemented a probabilistic approach to improve the effectiveness of traceability links by around 10% [ICSE'20]
- Learning to Identify Security-Related Issues Using Convolutional Neural Networks achieving a 96% success rate [ICSME'19]
- **Technical Skills:** Tensorflow, FastAI, RapidMiner, Spark, NumPy, Pandas, Pytorch, Scikit-learn, Matplotlib, Keras, Overleaf, LaTeX.
- **Soft Skills:** Time Management, Teamwork, Presentation skills, Dedication, Meeting deadlines, Motivation, Self-supervising, Public Speaking, Storytelling, Writing reports and proposals, Listening, Persuasion, Critical Observation, Flexibility, Resourcefulness, Mentoring.

Evolutionary Computation for Software Engineering

Bogota, Colombia

UNAL, ALIFE Research Group

Feb 2015 - Dec 2016

- **Thesis:** A computational solution for the software refactoring problem based on a hybrid adaptive evolutionary algorithm achieving better time complexity and feasible refactoring recommendations [GECCO'18]
- **Technical Skills:** Java and Scala with Genetic Algorithm, NumPy, Overleaf, LaTeX.
- **Soft Skills:** Logical Thinking, Innovation, Problem-solving, Presentation skills, Report writing, Accepting feedback.

Interests

Research	Causal inference (CI), Causal Machine Learning, Interpretability, Deep learning (DL), Evolutionary Computation.
Software Research	Code Generation & Representation, Software Engineering Automation, Causal Software Engineering.
Statistics	Interested in statistical programming. Particularly, Causal Inference libraries.
Sports	Hiking, Kayaking.
Music	Fond of almost all types of music such as traditional Latino, disco, EDM, Turkish, pop, and Japanese.

Languages

English	Professional proficiency
Spanish	Native proficiency
German	Basic proficiency

References available upon request.