Paola Gabriela Pesántez Cabrera

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About: Driven, innovative thinker, detailed oriented, and lifelong learner. Experienced team leader, researcher, and teacher with a proven track record of implementing unique methodologies to difficult problem sets to deliver exceptional results. I am interested in the development of artificial intelligence and machine learning applications with a direct impact in climate and economic sustainability. I am an avid advocate of accessible education, generation of knowledge, respect for diversity, and visualization and engagement of Latin American women in STEM.

Education:

Washington State University
Ph.D. in Computer Science   G.P.A: 3.90/4   **08/2013– 05/2018**

Washington State University
M.Sc. in Computer Science   G.P.A: 3.87/4   **08/2011– 05/2013**

Universidad de Cuenca (Ecuador)
Bachelor's degree: Systems Engineering   G.P.A: 95.61/100   **09/2003 – 05/2009**

Skills:

Languages:	Spanish (native), English (proficient), Italian (basic)
Applied Mathematics:	Analysis, Linear Algebra, Graph Theory
Programming Languages:	Python, C++, Java, JavaScript, Golang, Matlab, R, Scala
Data Science Packages:	Numpy, Pandas, SciPy, Matplotlib
Machine Learning Libraries:	Scikit-learn, TensorFlow, Pytorch
Web Technologies:	WordPress, React, HTML5, CSS3, Bootstrap, jQuery, Node.js/Express, Flask
Version Control Systems:	Git/Github
Databases:	MongoDB, SQL, MySQL
Methodologies & Techniques:	Waterfall, Agile (Scrum, Kanban), TDD, DDD
Agile work management tools:	Jira, SmartSheet
Cloud Platforms:	AWS, Microsoft Azure

Professional Experience:

Research Assistant Professor   **08/22 – Present**
Washington State University, Pullman, Washington

Researcher – Data Scientist   **09/21 – Present**
- Data manager at the AI Institute: Agricultural AI for Transforming Workforce and Decision Support (AgAID) supported by NSF and USDA-NIFA by the AI Research Institutes program, under award No. 2021-67021-35344. https://agaid.org
- Data manager at the Washington Soil Health Initiative.
- Coordinator of creating the cyberinfrastructure needed for acquisition, storage, analysis, sharing, and publication of data and models (software).
- Developer in charge of updating and maintaining the corresponding websites.

Software Engineer 06/21 – 08/21
IOET Inc., Quito, Ecuador
- Development of risk and control mitigation measures in legacy code for an American online retailer of prescription glasses and sunglasses based in NY city.
- Tech stack: Python, JavaScript, PostgreSQL

Associate Professor 10/09 – 08/20
Universidad de Cuenca, Cuenca, Ecuador
- Teacher of different subjects such as programming (data structures), differential calculus, discrete mathematics, graph theory, introduction to computer technology, and basic computer concepts in the Schools of Computer Science, Civil Engineering, and Telecommunications.
- Contributor of several research projects in different areas such as using Learning Analytics to improve Higher Education in Latin America, designing Architectures and Interaction Models for Assisted Living Environments aimed at elderly people, Active Mobility and Urban Environment, and using Intelligent Assistants for Spatial Data Infrastructures.
- Coordinator of social volunteer projects within the computer science career. Extensive experience in managing them and formulating collaboration agreements with institutions. Leader of the project "Knowledge Generation in Information and Communication Technologies" with the aim of expanding employment opportunities, entrepreneurship, and educational reintegration, favoring personal, social, and educational growth of children and adolescents. Participation in the project "Schools as healthy spaces: promotion of healthy practices" through the analysis and design of an application whose main objective was to motivate a nutritious diet and physical activity in children and adolescents.

PhD Data Science Intern 05/26/15 – 08/14/15
Pacific Northwest National Laboratory, Richland, Washington, USA
- Automated knowledge graph construction and natural language processing (relation extraction, entity disambiguation) from Twitter.
- Tech stack: Scala, Perl, R, Python.

Software Developer 02/09 – 04/09
ITSDP, Department of Surgery of Virginia Commonwealth University and COBUS, Quito, Ecuador
- Development of an online/offline Trauma Registry System. It supported multiple languages.
- Tech stack: .NET, SQL.

Software Developer 09/08 – 10/09
Electro Generadora del Austro S.A., Cuenca, Ecuador
- Development of software to perform monitoring, control, and verification of the processes and activities that environmental employees should complete as part of the Environmental Handling Plan.
- Implementation of a content manager to handle the documentation associated with each completed activity.
- Tech stack: Oracle Forms, Oracle database, Java, Alfresco (Content Management platform).

Research Projects:

Heat Stress Management 12/22 – Present
AgAID Institute
- Identify good sources of data and process them from different kinds of crops: apples, grapes, cherries.
- Deployment of a smartphone app that uses nearby weather station data to heat stress danger since many growers may not be able to invest in in-field sensors, but everybody has a smartphone.

Deficit Irrigation - Prediction of soil water content for Plant Water Stress 08/22 – Present
AgAID Institute
Identify good sources of data and process them from different kinds of crops: apples, grapes, cherries. Use the information generated by the AgAID Demo Farm.

IBM seasonal forecasts 08/22 – Present
AgAID Institute

Evaluate the accuracy of commercial seasonal forecast products available via the IBM PAIRS platform. Take a hindcast approach and compare the seasonal forecasts with observations and develop skill metrics to integrate those forecasts into our AgAID decision workflows related to water availability. This project has the collaboration of the IBM PAIRS team.

Weather data imputation   **06/22 – Present**
AgAID Institute
Develop and implement weather station correlation methodology for site-specific usage in case of missing data from a preferred station. Work in collaboration with AgWeatherNet.

Topological Data Analysis framework for multi-cultivar spatio-temporal data   12/21 – Present
AgAID Institute
- Define topological data analysis workflows to capture multi-cultivar divergence and conserved behavior in cold hardiness suing mapper and persistent homology.
- Implement an open-source software for topological analysis, clustering, and visualization for spatio-temporal data.
- Investigate methods to incorporate topological information into multi-task learning to improve prediction efficacy on single and multi-cultivar data.
- Investigate approaches to use results from topological data analysis for data imputation in AWN data.

Frost Mitigation – Cold Hardiness Prediction   **10/21 – Present**
AgAID Institute
- Process the inputs to the prediction problem consisting of air and soil temperatures, humidity, dew point, precipitation, wind speed, radiation, leaf wetness, and evapo-transpiration (ETO and ETR) on a daily basis over a season provided by AgWeatherNet and LTE_10, LTE_50, and LTE_90 the lethal temperatures at which 10, 50, and 90% of the buds freeze at different points in the season provided by WSU viticulture team.
- Plan the launch of a new effort on decision support for frost mitigation.
- Develop web visualization tool for visualization of cold hardiness data using Python, Flask, and Heroku.
- Develop a framework using topological data analysis to identify conserved and discrepant cold hardiness behavior among the multiple cultivars.
- Building collaboration between the different groups developing cold hardiness models.

Assisted Living Environments aimed at elderly people   **09/19 – 08/20**
Universidad de Cuenca, Cuenca, Ecuador
Proposed methods and technological solutions (hardware and software) that will allow caregivers to help impaired elderly people to delay the damage of cognitive functions which comes with age and to healthy older adults to maintain and improve theirs.
- Fog Computing applied to monitoring devices
- Integration of new technologies for the design of cognitive solutions. Evaluation of attention and memory areas.
- Design of Architectures and Interaction Models. Case study: Playful and Social Environments

Learning Analytics for the Study of Self-Regulated Learning Strategies in a Hybrid Learning Context
Universidad de Cuenca, Cuenca, Ecuador   **09/19 – 08/20**
Developed the proposal for the Design and Evaluation of a Dashboard for the Analysis of Learner Behavior and Dropout Prediction in Moodle.

Intelligent Assistants for Spatial Data Infrastructures   **01/19 – 08/20**
Universidad de Cuenca, Cuenca, Ecuador
Led the research and publication of a scoping review on the use, processing, and fusion of geographic data in virtual assistants. Also, performed analysis of all the existent applications up to date.

Active Mobility and Urban Environment   **19/06/18 – 08/20**
Universidad de Cuenca, Cuenca, Ecuador
Proposed a software architecture for a mobility and urban environment data analysis platform. The stakeholders were able to automate, integrate, and manage their diverse information sources, processes, and applications. The system for management, analysis, and visualization allowed the collection and

storage of data in various formats. In addition, it performed geospatial analysis, statistical analysis, and data mining analysis of the stored information.

ERASMUS+: Building Capacity to Use Learning Analytics to Improve Higher Education in Latin America (LALA)
Universidad de Cuenca, Cuenca, Ecuador 09/02/17 – 08/20
Integrated Learning Analytics within Universidad de Cuenca adapting dashboards and other technological tools to help teachers and students to visualize the progress in a subject. The information also helped authorities to make informed decisions to reduce dropout rates.

Community Detection on Bipartite Networks: Algorithms and Applications 19/08/13 – 18/04/18
Washington State University, Pullman, WA
Ph.D. thesis directed by Professor Ananth Kalyanaraman, Ph.D.
Defined a new variant of the Murata's bipartite modularity metric, called Murata+. Developed an efficient bipartite graph community detection tool called biLouvain based on the metric. biLouvain substantially outperforms all the other state-of-the-art existing tools compared in our study, in execution time (by orders of magnitude), quality (robust community structures with high modularity scores), and memory consumption.
- Tech stack: C++, Perl, R, Python, Mango, Visone.
- Project's URL: https://github.com/paolapesantez/biLouvain

Simulation of Skin Irradiation 05/17/12 – 04/12/13
Washington State University, Richland, WA
Master's degree graduation project directed by   Professor John Miller, Ph.D.
Performed a Kinetic Simulation to obtain cell counts at multiple continuous times to predict thickness of skin's layers and to calculate the amount of energy deposited at the different layers of skin at different thicknesses. Then experimental data was gathered, processed, and fit from the Monte-Carlo simulation of low energy electron particle tracks in liquid water using the Positive Ion Track Simulation (PITS) code set. The results at the different layers were visualized using the resultant energy deposited matrices.
- Tech stack: C++, Matlab, C, Perl.

Software Projects:

Cold Hardiness Visualization Tool 02/22 – 06/22
- Tech stack: Python, Flask, Heroku. https://agaiddatavisualization.herokuapp.com

Golang Skill Factory | Skiller/developer 12/2020-02/2021
- Back-end development of a Microblogging social network like Twitter. The project was structured using MVC.
- Tech stack: Golang, MongoDB, Heroku, Postman, Git, RESTFUL web services.

Web Applications | Student/developer 09/2020-01/2021
- **To do list:** application to write the items of a to do list and to delete them once they have been completed.
- **Newsletter subscription:** application that allows a user to subscribe to a newsletter using mailchimp.
- **Blog:** application that allows a user create entries to their online blog.
- Tech stack: React, HTML, CSS, JavaScript, jQuery, NodeJS, MongoDB, Heroku, Postman, Git, RESTFUL web services.
- Project's URL:
  - To do list: https://morning-reaches-56115.herokuapp.com/
  - Newsletter subscription: https://fast-castle-02827.herokuapp.com/
  - Blog: https://powerful-waters-21284.herokuapp.com/

Suffix Tree | Student/developer 11/2014
- Code to build and use a suffix tree.
- Tech stack: C++
- Project's URL: https://github.com/paolapesantez/Suffix-Tree

Local/Global sequence alignment | Student/developer   **10/2014**
- Code that performs local and global sequence alignment for DNA/protein sequences, implementing the Smith Waterman and Needleman Wunsch Sequence Alignment Algorithms with affine gap penalty.
- Tech stack: C++
- Project's URL: https://github.com/paolapesantez/Sequence-Alignment

Simulation of Tomasulo's algorithm | Student/developer   **09/2013**
- Code that simulates Tomasulo's (computer architecture hardware) algorithm for dynamic scheduling of instructions. It allows out-of-order execution and enables more efficient use of multiple execution units.
- Tech stack: C++
- URL: https://github.com/paolapesantez/Tomasulo-Algorithm

Publications:

Sejal Welankar, **Paola Pesántez-Cabrera**, Bala Krishnamoorthy, Ananth Kalyanaraman, "Persistence homology to study cold hardiness of grape cultivars" in Proceedings 2023 AAAI Workshop on Agriculture and Food Systems (AIAFS), 2023.

Aseem Saxena, **Paola Pesántez-Cabrera**, Rohan Ballapragada, Markus Keller, Alan Fern, "Multi-Task Learning for Budbreak Prediction" in Proceedings 2023 AAAI Workshop on Agriculture and Food Systems (AIAFS), 2023.

Aseem Saxena, **Paola Pesántez-Cabrera**, Rohan Ballapragada, Kin-Ho Lam, Markus Keller, Alan Fern, "Grape Cold Hardiness Prediction via Multi-Task Learning" in the Thirty-Fifth Annual Conference on Innovative Applications of Artificial Intelligence (IAAI-23), 2023.

Carlos Granell, **Paola Pesántez-Cabrera**, Luis M. Vilches-Blázquez, Rosario Achig, Miguel R. Luaces, Alejandro Cortiñas-Álvarez, Carolina Chayle, Villie Morocho-Zurita, "A scoping review on the use, processing, and fusion of geographic data in virtual assistants" in Transactions in GIS, 2021.

Christian Quinde, David Guillermo, Lorena Siguenza-Guzman, Daniel Orellana, and **Paola Pesántez-Cabrera**, "A Software Architecture Proposal for a Data Platform on Active Mobility and Urban Environment", Conference on Information and Communication Technologies of Ecuador (TICEC), 2020.

Edisson Sigua, Bryan Aguilar, **Paola Pesántez-Cabrera**, Jorge Maldonado-Mahuad, "Proposal for the Design and Evaluation of a Dashboard for the Analysis of Learner Behavior and Dropout Prediction in Moodle", the XV Latin American Conference on Learning Technologies (LACLO), 2020.

Edwin Cabrera, Paola Cárdenas, Priscila Cedillo, **Paola Pesántez-Cabrera**, "Towards a Methodology for creating Internet of Things (IoT) Applications based on Microservices", the 2020 IEEE International Conference on Services Computing (SCC), 2020.

Paola Pesántez-Cabrera, María Inés Acosta, Verónica Jimbo, Pablo Sinchi, and Priscila Cedillo, "Towards an evaluation method of how accessible serious games are to older adults", the 8th IEEE International Conference on Serious Games and Applications for Health (IEEE SeGAH), 2020.

Henrique Chevreux, Valeria Henríquez, Eliana Scheihing, Pedro Muñoz-Merino, Tinne De Laet, Mar Pérez-Sanagustín, Isabel Hilliger, Jorge Maldonado-Mahuad, **Paola Pesántez-Cabrera**, and Margarita Ortíz, "Assessing Risk in Learning Analytics Projects", Companion Proceedings 10th International Conference on Learning Analytics & Knowledge (LAK20), 2020.

Tom Broos, Isabel Hilliger, Mar Pérez-Sanagustín, Nyi-Nyi Htun, Martijn Millecamp, **Paola Pesántez-Cabrera**, Lizandro Solano-Quinde, Lorena Siguenza-Guzman, Miguel Zuñiga-Prieto, Katrien Verbert, and Tinne De Laet, "Coordinating Learning Analytics policymaking and implementation at scale", British Journal of Educational Technology, 2020.

Isabel Hilliger, Margarita Ortiz-Rojas, **Paola Pesántez-Cabrera**, Eliana Scheihing, Yi-Shan Tsai, Pedro J Muñoz-Merino, Tom Broos, Alexander Whitelock-Wainwright, Dragan Gasevic, and Mar Pérez-Sanagustín,

"Towards learning analytics adoption: A mixed methods study of data culture in Latin American universities", British Journal of Educational Technology, 2020.

Isabel Hilliger, Margarita Ortiz-Rojas, **Paola Pesántez-Cabrera**, Eliana Scheihing, Yi-Shan Tsai, Pedro J. Muñoz-Merino, Tom Broos, Alexander Whitelock-Wainwright, Mar Pérez-Sanagustín, "Identifying needs for learning analytics adoption in Latin American universities: A mixed-methods approach", The Internet and Higher Education, Volume 45, 2020, 100726, ISSN 1096-7516, https://doi.org/10.1016/j.iheduc.2020.100726.

Isabel Hilliger, Mar Pérez-Sanagustín, Margarita Ortíz-Rojas, **Paola Pesántez-Cabrera**, Eliana Scheihing, Yi-Shan Tsai, Pedro J. Muñoz-Merino, and Tom Broos, "Assessing Institutional Needs for Learning Analytics Adoption in Latin American Higher Education", Proceedings 9th International Conference on Learning Analytics & Knowledge K19). March 2019.

Paola Pesántez-Cabrera, Ananth Kalyanaraman and Mahantesh Halappanavar, "Exploiting intra-type information in bipartite community detection", Proceedings SIAM Network Science workshop, (accepted as a short paper), p.2, 2018.

Paola Pesántez-Cabrera, and Ananth Kalyanaraman. "Efficient Detection of Communities in Biological Bipartite Networks", IEEE/ACM Transactions on Computational Biology and Bioinformatics (TCBB). 2017.

Paola Pesántez-Cabrera, and Ananth Kalyanaraman. "Detecting Communities in Biological Bipartite Networks", the 7th ACM Conference on Bioinformatics, Computational Biology, and Health Informatics (ACM-BCB). 2016.

Baichuan Zhang, Sutanay Choudhury, Mohammad Al Hasan, Xia Ning, Khushbu Agarwal, Sumit Purohit, **Paola Pesántez-Cabrera**, "Trust from the past: Bayesian Personalized Ranking based Link Prediction in Knowledge Graphs", SDM workshop on Mining Networks and Graphs. 2016.

Paola Pesántez-Cabrera, Cläre Von Neubeck, Marianne B. Sowa, John H. Miller, "Kinetic model of development and aging of artificial skin based on analysis of microscopy data", INTECH Microscopy and Analysis Book. September 2016.

Posters:

Sejal Welankar, **Paola Pesantez-Cabrera**, Ananth Kalyanaraman, "Extracting patterns in cold hardiness behavior using topological data analysis", Fourth International Workshop on Machine Learning for Cyber-Agricultural Systems (MLCAS), 2022.

Paola Pesántez-Cabrera, Ananth Kalyanaraman and Mahantesh Halappanavar, "Exploiting intra-type information in bipartite community detection", SIAM Network Science workshop, 2018.

Paola Pesántez-Cabrera and Ananth Kalyanaraman, "Scalable Algorithms for Clusering Heterogeneous Biological Networks", ACM International Workshop on Big Data in Life Sciences, 2014.

Honors:

Udacity AWS Machine Learning Scholarship	**25/06/21**
ACM-BCB 2016 NSF Travel Award	**08/13/16**
SC16 Student Volunteer Award	**07/19/16**
Outstanding Performance Award at Pacific Northwest National Laboratory	**08/15/15**
ACM-BCB 2015 NSF Travel Award	**08/07/15**
ACM-BCB 2014 Big Data in Life Sciences Travel Award	**08/21/14**
EECS Outstanding TA award	**04/10/14**
Academic award to continue PhD. program at Washington State University	**05/10/13**
Fulbright Scholarship to study in the United States	**04/01/11**
Graduated with honors at Universidad de Cuenca, ranked 1 out of 20	**05/15/09**
"Benigno Malo" prize in recognition of academic merit at Universidad de Cuenca	**10/21/08**

Program Committee Member:
        ETCM 2021: IEEE Ecuadorian Technical Chapters Meeting
        LALA 2020: Third Latin-American Conference on Learning Analytics
        ACM-BCB 2020: 11th ACM Conference on Bioinformatics, Computational Biology, and Health Informatics
        HiPC 2019: 26th IEEE International Conference on High Performance Computing, Data, and Analytics
        GrAPL 2019: Workshop on Graphs, Architectures, Programming, and Learning
        LALA 2019: Second Latin-American Conference on Learning Analytics
        LALA 2018: First Latin-American Conference on Learning Analytics
        I+D+I 2017: Second Congress on Innovation + Development + Engineering

Reviewer:
        IEEE Access
        Scientific Programming