Baldwin Cortes, Ph.D.

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SUMMARY

Experienced engineer with expertise in renewable energy systems, data science, and machine learning. Developed groundbreaking techniques for optimizing photovoltaic systems' performance using deep reinforcement learning, including novel maximum power point tracking methods. Proficient in cloud computing services, like Microsoft Azure Cloud and Huawei Cloud services. Recently granted an AI certification from Huawei and selected for a fully-funded training program in Hangzhou, China, focusing on cutting-edge AI algorithms. Committed to driving sustainable solutions and staying at the forefront of emerging technologies.

EXPERIENCE

Research Scientist   Mar 2018 - Feb 2022

- Managed data acquisition and cleaning for a weather station, processing over four million measurements across four years.
- Conducted time series forecasting experiments using deep learning algorithms for local irradiance, surpassing state-of-the-art models by improving prediction accuracy by over 0.8%.
- Developed a novel method using deep learning to characterize photovoltaic panels, reducing the parameter error estimation by 50% compared to the most widely used method.
- Innovated multiple maximum power point tracking techniques for photovoltaic systems utilizing deep reinforcement learning, surpassing the performance of state-of-the-art algorithms by increasing power generation by over 2%.

Adjunt Professor   Oct 2015 - Aug 2019

Lectured, facilitated class discussions, and organized various teaching activities for courses including Digital Electronics, Digital Control, Microcontrollers, and Instrumentation

EDUCATION

2018 - 2022	Ph.D. in Electrical Engineering at **Universidad Michoacana (UMNSH)**	(GPA: 4.0/4.0)
2015 - 2017	M.Sc. in Electrical Engineering at **Universidad Michoacana (UMNSH)**	(GPA: 4.0/4.0)
2009 - 2014	B.Sc. (*Hons*) in Electronics Engineering at **Universidad Michoacana (UMNSH)**	(GPA: 3.7/4.0)

Ph.D. Thesis	Deep Reinforcement Learning and Demonstrations Applied to Global MPPT in Photovoltaic Systems
M.Sc. Thesis	Design of a Takagi-Sugeno Fuzzy Observer for an 11-Tray Batch Binary Distillation Column
B.Sc. Thesis	Portable Digital Oscilloscope with Bluetooth Communication, Based on Signal Processor and Android Device

LANGUAGES

Spanish (Native), English (C1).

SKILLS

PV Systems	Modelling, Characterization, Simulation, Maximum Power Point Tracking.
Time Series	Analysis, Modelling, Forecasting
Control Theory	Optimal Control, Sliding Modes, State Space, Observers.
Programming Languages	Python, MATLAB, C, JavaScript, VHDL
Machine Learning Frameworks	PyTorch, TensorFlow, Keras, Scikit-Learn, LightGBM, XGBoost
Deep Learning	CNN, ResNet, Transformer, NLP, Image Processing
Deep Reinforcement Learning	RLlib, Stable Baselines3, TF Agents, Open AI Gym
Big Data Tools	Apache Spark, Databricks
Cloud Platforms	Microsoft Azure, Huawei Cloud
Web Development	HTML5, JavaScript, CSS3
Database Management	SQL, MongoDB
Workflow Management	Apache Airflow, Kedro
Version Control	Git, GitHub, GitLab

CERTIFICATIONS

University of Michigan: Digital Twins	(2024)
Microsoft Certified: Azure Data Scientist Associate	(2024)
Databricks Lakehouse Fundamentals	(2024)
Huawei Advanced Training on Artificial Intelligence	(2024)
DeepLearning AI Deep Learning Specialization	(2024)
Huawei Certified ICT Associate-AI	(2024)
Stanford University & DeepLearning AI Machine Learning Specialization	(2023)
Microsoft Certified: Azure AI Fundamentals	(2023)
Google Advanced Data Analytics	(2023)
Google Data Analytics Certificate	(2023)

HONORS & AWARDS

Highest GPA of the 3rd Semester of the Doctoral Program in Electrical Engineering	(2019)
CENEVAL Award for Excellence in EGEL Performance	(2015)
First Place in the 2014 Technological Development Prototype Contest	(2014)
First Place of the Class in the Electronic Engineering Degree Program	(2014)

WORKSHOPS & SEMINARS

Efficient Computing in Python	(2019)
4th Workshop on Monitoring, Diagnostics, and Fault-Tolerant Control	(2016)
Sliding Mode for Engineering Application	(2015)

PUBLICATIONS

Cortés, Baldwin, Roberto Tapia, and Juan J. Flores (2021a). "A Behavioral Cloning based MPPT for Photovoltaic Systems: Learning Through P&O Demonstrations". In: *2021 IEEE International Autumn Meeting on Power, Electronics and Computing (ROPEC)*. Vol. 5, pp. 1–6. DOI: 10.1109/ROPEC53248.2021.9668084.

Cortés, Baldwin, Roberto Tapia, and Juan J. Flores (2021b). "System-Independent Irradiance Sensorless ANN-Based MPPT for Photovoltaic Systems in Electric Vehicles". In: *Energies* 14.16. ISSN: 1996-1073. DOI: 10.3390/en14164820. URL: https://www.mdpi.com/1996-1073/14/16/4820.

Cortés, Baldwin, Roberto Tapia, and Juan J. Flores (2020). "Characterization of a polycrystalline photovoltaic cell using artificial neural networks". In: *Solar Energy* 196, pp. 157–167. ISSN: 0038-092X. DOI: https://doi.org/10.1016/j.solener.2019.12.012. URL: https://www.sciencedirect.com/science/article/pii/S0038092X19312265.

Flores, Juan J., Baldwin Cortés, José R. Cedeño González, et al. (2020). "Prediction of the Solar Resource through Differences". In: *2020 IEEE International Autumn Meeting on Power, Electronics and Computing (ROPEC)*. Vol. 4, pp. 1–6. DOI: 10.1109/ROPEC50909.2020.9258682.

Flores, Juan J., Josué D. González, Baldwin Cortés, et al. (2019). "Evolving SARIMA Models Using cGA for Time Series Forecasting". In: *2019 IEEE International Autumn Meeting on Power, Electronics and Computing (ROPEC)*, pp. 1–6. DOI: 10.1109/ROPEC48299.2019.9057132.

Orozco, Gilberto, Baldwin Cortés, Mario Heras, et al. (2016). "Analysis and comparison of distillation column models considering constant and variable relative volatility". In: *2016 IEEE International Autumn Meeting on Power, Electronics and Computing (ROPEC)*, pp. 1–6. DOI: 10.1109/ROPEC.2016.7830590.