CURRICULUM VITAE

EDUCATION AND QUALIFICATIONS

2020-2023 **Master of Science (with Distinction) in Data Science (Earth Observation and Computer Vision)**
University of Edinburgh (Scotland, United Kingdom)
Dissertation: "Unravelling Space Deceptions: A Deep Learning Approach to Unmasking Deepfake Satellite Images Using Spatial and Spectral Techniques".

2009-2010 **Master in Business Administration – Data Science and Quantitative Finance**
University of Oxford (England, United Kingdom)
Dean's List Trinity Term 2010 (top 10%)

2001-2006 **Summa Cum Laude Undergraduate Degree**
Universidad Católica Argentina (UCA) (Argentina)

RELEVANT WORK EXPERIENCE

11/2020 – Current
World Bank Group, Independent Evaluation Group, Washington DC, USA
Data Scientist – Earth Observation and Geospatial Analysis
Full time: since 2/2022 | 50% cross-support: 11/2020-1/2022
• Lead research and implementation of remote sensing and computer vision techniques for geospatial analysis, with a focus on developing and testing robust data methodologies for evaluation (since 2024).
• Currently researching, testing, and developing super-resolution techniques for satellite imagery to enhance spatial resolution and image quality.
• Designed and executed geospatial analyses integrating daytime and nighttime satellite imagery, drone imagery, gridded geospatial datasets, and digital streetview images; applied supervised/unsupervised classification, semantic segmentation, and convolutional neural networks to extract actionable insights.
• Developed and tested methodologies combining conventional and non-traditional data sources — including satellite imagery, socioeconomic indicators, and project implementation data — to improve evaluation accuracy and spatial targeting.
• Built supervised and unsupervised natural language processing (NLP) models to analyze World Bank project documents, enabling automated classification of 1,000+ documents and enhancing portfolio review via keyword generation and similarity-based training set refinement.
• Authored journal articles, book chapters, working papers, guidance notes, methodological notes, and blog posts on data science applications for the evaluation of international development projects.
• Organized World Bank's 2024 international geospatial symposium Unlocking the Potential of Geospatial Analysis for Evaluations, convening geospatial experts and evaluators globally.
• Designed and conducted applied experiments on the use of generative AI tools (ChatGPT, Claude, DALL·E) for evaluative analysis, resulting in blog series, training sessions, and presentations.
• Presented at international conferences on data science-driven methodologies for evaluating development interventions, highlighting advances in geospatial and machine learning techniques.
• Developed and delivered training programs for IEG staff on geospatial analysis, heterogeneous data integration, remote sensing, and computer vision techniques.
• Currently authoring a book chapter on geospatial artificial intelligence for evaluation practice, scheduled for publication in 2025.
• Member of the Geospatial Analysis in Evaluation Community of Practice, collaborating with colleagues

from UNDP, FAO, EBRD, ADF, and GEF.
• Co-Chair of the IEG Data Science Community of Practice (2023–2024).

09/2016 – 1/2022
World Bank Group, International Finance Corporation (IFC), Washington DC, USA
Associate Operations Officer
Full time: 9/2016 – 11/2020 | 50% cross-support: 11/2020-1/2022

- Led the compilation, harmonization, and analysis of project data from multiple databases to monitor risk and exposure in specific countries, applying machine learning algorithms to enhance risk assessment.
- Conducted a network analysis of international trade transactions (2005–2020), using Python (NetworkX) to analyze 60,000+ transactions between 500 banks worldwide. Assessed network connectedness over time to evaluate the impact of a World Bank trade finance program in developing countries. The analysis was complemented by an interactive Tableau visualization illustrating trade flows.
- Designed a data strategy for the Trade unit, outlining medium- and long-term solutions to improve data architecture, enhance process automation, and integrate machine learning for transactional data analysis.
- Developed an interactive and automated database to track and manage the utilization of limits for US$8.5 billion across 600+ banks and multiple global trade finance products.
- Automated the generation of monthly reports, significantly reducing preparation lead time and operational risk by streamlining data processing and reporting workflows.
- Since November 2020, I provided cross-support to IEGMA (50% of my time), applying data science methodologies to enhance evaluation.

08/2015 – 09/2016
World Bank Group, Development Finance, Washington DC, USA
Operations Analyst

- Developed statistical models to analyze key parameters influencing trust funds' cost recovery, contributing to the design of a new Cost Recovery Directive.
- Designed and implemented simulation models and conducted scenario analyses to assess the projected impact of the Cost Recovery Directive on trust funds.
- Led the geospatial analysis for the Malawi Drought 2015–2016 Post-Disaster Needs Assessment, leveraging satellite imagery to assess drought impact and support recovery planning.

08/2013 – 05/2015
World Bank Group, Water and Sanitation Program (WSP), Washington DC, USA
Data Science Consultant (ETC)

- Co-developed a data-driven methodology to model water and sanitation access rates for the bottom 40% of the population, leveraging survey microdata for improved policy insights.
- Designed an Earth Observation-based methodology to monitor water balance, integrating evapotranspiration, water runoff, and precipitation data for enhanced water resource management.
- Led a team of five consultants to develop forecasts on rural sanitation access rates across 13 countries and conducted scenario analyses to identify necessary shifts in access rates to achieve universal coverage by 2030.
- Developed automated visualizations to monitor WSP's portfolio

08/2010 – 08/2013
World Bank Group, World Bank Institute, Washington DC, USA
Data Analysis and Visualization Consultant (STT/STC)

- Supported multiple teams in conceptualizing and creating interactive data visualizations (including maps, charts, and graphs) combining multiple types of data (numerical data, text, geographical elements, etc.)
- Constructed and maintained relational database in MS Access.

- Developed the "Ready to Scale" tab, included in the program's external website, containing articles and data visualizations I created.

PUBLISHED PAPERS

- Ziulu, Virginia, and James Garforth. "Advancing Deepfake Detection in RGB Satellite Imagery Through Domain-Specific Ensembles". In IGARSS 2025-2025 IEEE International Geoscience and Remote Sensing Symposium, pp. 5821-5827. IEEE, 2025.

- Naeher, Dominik, and Virginia Ziulu. "Does adoption of zero tillage reduce crop residue burning? Evidence from satellite remote sensing and household survey data in India." Applied Economics (2025): 1-15.

- Ziulu, Virginia. "Leveraging Imagery Data in Evaluations. Applications of Remote-Sensing and Streetscape Imagery Analysis." IEG Methods and Evaluation Capacity Development Working Paper Series. Independent Evaluation Group. Washington, DC: World Bank (2024).

- Naeher, Dominik, Raghavan Narayanan, and Virginia Ziulu. "Cash for Coolers or Sustainable Lighting? Assessing Different Components of a Large-Scale Energy Efficiency Program in Mexico." The Journal of Development Studies (2024): 1-15.

- Ziulu, Virginia, Jessica Meckler, Gonzalo Hernández Licona, and Jozef Vaessen. "Poverty Mapping: Innovative Approaches to Creating Poverty Maps with New Data Sources." IEG Methods and Evaluation Capacity Development Working Paper Series. Independent Evaluation Group. Washington, DC: World Bank (2022).

- Naeher, Dominik, Raghavan Narayanan, and Virginia Ziulu. "Impacts of energy efficiency projects in developing countries: Evidence from a spatial difference-in-differences analysis in Malawi." Energy for Sustainable Development 73 (2023): 365-375 (Working paper version: World Bank Policy Research Working Paper 9842).

- Naeher, Dominik, Raghavan Narayanan, and Virginia Ziulu. "The relevance of development policies to confront crisis situations: World Bank's early response to Covid-19". Journal of Policy Modeling (2024). (Working paper version: World Bank Policy Research Working Paper 9935).

- Chase, Claire, Virginia Ziulu, Priya Lall, Phyrum Kov, Susanna Smets, Virak Chan, and Yeng Lun. "Addressing the behavioral constraints to latrine uptake: effectiveness of a behavior-change campaign in rural Cambodia." Waterlines (2015): 365-378.

BOOK CHAPTERS

- Ziulu, Virginia, Harsh Anuj, Ariya Hagh, Estelle Raimondo, Jos Vaessen. "Extracting Meaning from Textual Data for Evaluation – Lessons from Recent Practice at the Independent Evaluation Group of the World Bank" (Chapter 5 of book "Artificial Intelligence and Evaluation. Emerging Technologies and their Implications for Evaluation").

- Anuj, Harsh, Virginia Ziulu, Ariya Hagh, Estelle Raimondo, and Jos Vaessen. "World Bank IEG evaluations and the role of data science: reflections from recent experiences" (Chapter 11 of book "Artificial Intelligence and Big Data").

DRAFT PAPERS AND BOOK CHAPTERS

- Ziulu, Virginia, and James Garforth. "Toward Efficient, Explainable Satellite Deepfake Detection: Colour and Frequency Band Contributions". To be submitted to IGARSS 2026.

- Singh, Kunwar, Amy Frazier, Virginia Ziulu, and Jordan Landrum. "Harnessing drones to incept and evaluate climate-smart agriculture interventions for sustainable development". To be submitted to Nature Sustainability.

- Ziulu, Virginia. "Geospatial Artificial Intelligence in Evaluation Practice" (Chapter of textbook "Geospatial Impact Evaluation in Practice"). To be published in 2026.

- Ziulu, Virginia, Estelle Raimondo, and Claire Zanuso. "Broadening the use of geospatial analysis for evaluation practice: the way forward" (Chapter of textbook "Geospatial Impact Evaluation in Practice"). To be published in 2026.

- Ziulu, Virginia, Maria de las Mercedes Vellez, Elena Bardasi, and Xiaoxiao Peng. "Leveraging Classic and Generative AI for Text Classification in Evaluation: Insights from Recent IEG Applications". IEG Methods Paper Series. To be published in 2026.

- Ziulu, Virginia , and Taru Meshram. "Super-resolution approaches for satellite imagery" (working title). IEG Methods Paper Series. To be published in 2026.

SELECTED PRESENTATIONS AT CONFERENCES

- "Spatial Evidence for Climate Action: Generating Insights through Geospatial Analysis", 2025 United Nations Climate Change Conference, Evidence for Climate Action (E4CA), Virtual, 17 November 2025.

- "Advancing Deepfake Detection in RGB Satellite Imagery Through Domain-Specific Ensembles", International Geoscience and Remote Sensing Symposium (IGARSS) 2025, Brisbane (Australia), 7 August 2025 (as part of the session "Data Security in Remote Sensing", for which I acted as chair).

- "Geospatial Artificial Intelligence in Evaluation Practice", GeoField conference, Agence Française de Développement (ADF), Paris (France), 28 May 2025.

- "Leveraging AI for Enhanced Imagery Analysis in Evaluations", Workshop on Artificial Intelligence, Global Environment Facility (GEF), Washington DC (United States), 16 April 2025.

- "From Pixels to Insights: Image Analysis for Evaluation", Eval-GIS Community of Practice, United Nations Development Programme (UNDP), Virtual, 9 May 2025.

- "Harnessing Image Data for Efficient Evaluation", National Evaluation Capacities (NEC) Conference 2024, Beijing (China), 14 October 2024.

- "Leveraging Text Data and Generative AI in Complex Thematic Evaluations", 10th Annual Measuring Development Conference: AI, the Next Generation, Center for Effective Global Action (CEGA) and University of Chicago, Washington DC (United States), 2 May 2024.

- "From Pixels to Geospatial Insights: IEG's Experience Leveraging Image Data in Evaluations", Geospatial Symposium: Unlocking the Potential of Geospatial Analysis for Evaluations, World Bank,

Washington DC (United States), 11 April 2024.

- "Exploring the Potential of Data Science for Evaluations", African Development Bank, Virtual, 30 January 2024.
- "From Pixels to Geospatial Insights", European Evaluation Society (EES), Virtual, 16 November 2023.
- "Deep Learning Applications for Geospatial Analysis", World Bank, Washington DC (United States), 21 September 2023.
- "Exploring the Potential of Generative Models for Evaluative Tasks at the World Bank", Applied Physics Laboratory (APL), Johns Hopkins University, Laurel MD (United States), 5 October 2023.
- "Data Science in Evaluations", Global Evaluation Initiative (GEI), Virtual, 8 March 2023.
- "Geospatial 2.0? Advances in the Use of Imagery Data for Evaluation", Asian Evaluation Week, Virtual, 15 September 2022.
- "Opportunities for Innovation in M&E: Data Science" (delivered in Spanish), gLOCAL 2022, Virtual, 30 May 2022.
- "Use of Image Data to Assess Urban Growth and Informality", European Evaluation Society (EES), Copenhagen (Denmark), 10 June 2022.
- "Leveraging Image Data Analysis for Evaluations", World Bank, Washington DC (United States), 26 January 2022.
- "Using Nighttime Lights Data to Evaluate the Impact of Energy Efficient Projects in Developing Countries", World Bank, Washington DC (United States), 6 October 2021.

ADDITIONAL RESEARCH ACTIVITIES

- Ad-hoc reviewer for the Unites States' National Science Foundation (NSF) on deep learning and geospatial analysis grant proposals. Since February 2023.
- Served as peer reviewer and discussant for the paper "*Harnessing Geospatial Impact Evaluation for Socio-Economic and Biophysical Assessment of Landscape Restoration*" presented at the GeoField symposium (Williamsburg, United States, January 17-18, 2025).

ADDITIONAL COURSES AND TRAINING

2025	**Beyond the Visible: Hyperspectral Remote Sensing** Earth Observation (EO) College (online)
2024	**Certified Remote (Drone) Pilot** United States Federal Aviation Administration (FAA)
2024	**IEEE International Geoscience and Remote Sensing Symposium (IGARSS)** Athens (Greece)

2022	**Deep Learning for AI and Computer Vision** Massachusetts Institute of Technology (MIT) (on campus)
2020	**Machine Learning (Artificial Intelligence MicroMasters)** Columbia University (USA) (through EdX)
2019	**Artificial Intelligence (Artificial Intelligence MicroMasters)** Columbia University (USA) (through EdX)
2019	**Deep Learning Nanodegree**, Udacity
2018	**AI Programming with Python Nanodegree**, Udacity
2013	**Statistics: Making sense of Data**, University of Toronto (through Coursera.org)
2013	**Data Analysis**, Johns Hopkins Bloomberg School of Public Health (through Coursera.org)

LANGUAGES

Spanish (Native), English (Bilingual Proficiency), French (Advanced).

PROGRAMMING AND SOFTWARE SKILLS

Proficient in Python, R, Google Earth Engine, QGIS, ArcGIS, and LaTeX. Familiar with Java and Java Script.