MIRCO A. MANNUCCI, PH.D.

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Professional Summary

Dynamic Director of Data Science and applied mathematician with over 25 years of experience, a passion for innovation through a blending of intrapreneurship and research and development (R&D). Highly skilled in big data cloud AI, advanced data modeling, and bleeding edge deep learning techniques, with a proven track record of delivering lasting results to clients across various industries.

In addition to my technical capabilities, I possess strong leadership and communication skills, making me adept at leading cross-functional teams and collaborating with stakeholders to identify business needs and develop AI-driven solutions. My background in academic teaching, books writing and research, combined with my excellent mentoring and coaching abilities, allows me to effectively transfer my knowledge and skills to others in the organization. I am motivated to help industry-leading companies redefine the future of data science, drive innovation through R&D, and implement, integrate and customize state-of-the-art deep learning techniques to stay ahead of the AI curve.

Core Competencies

- Technical Leadership
- Teaching & Mentoring
- Big Data Analytics
- Advanced Data Modeling
- Apache Spark
- Generative Models
- Azure & AWS ML Architecture
- Managing R&D teams

- Semantic Technologies
- Pure/Applied Mathematics
- Knowledge Graphs
- Graph & Temporal Deep Learning
- Explainable/Responsible AI
- APIs Design and Development
- Intelligent Search Technology
- MLFlow Agile Methodologies

Technical Skills

Programming Languages
- Scala, Python 3.7, R, Pig, Groovy, Java, C#, C++, SQL, Unix shell scripting (Bash), MATLAB.

Databases (no-SQL/SQL)
- Neptune, StarDog, Presto, Titan GraphDB, Hive, Neo4J, Cassandra, MongoDB, Redis, Microsoft SQL, Oracle, MySQL.

Cloud
- AWS (EC2. EMR, S3, GLUE, Athena, Lambda, SageMaker, Rekognition, Neptune), Azure (Blobs, DataFactory, Automation, Data Lake, Azure ML Studio, Azure Databricks).

Machine Learning Tools
- IDEs: Eclipse, Anaconda, Visual Studio ML Extension, Google Colab, SageMaker Studio.
- LIBRARIES Pandas, NumPy, SciPi, Seaborn, Pytorch, PyGeometric Temporal, HuggingFace, BioPython, TensorFlow, Keras, Networkx, Pygsp, DeepDow, GraphWave, DGL, KarateClub, StellarGraph. Apache Spark/Scala: MLIB, GraphFrames, pySpotLIght. SHAP.
- RESPONSIBLE AI: Google Responsible Toolkit, MS Fairlearn.

Work History

Director, Data Science   10/2019 to Current
ICF

- Led the development and execution of data analyses to support business decisions, establishing analysis best practices in statistical methods / data mining / modeling techniques, and designing complex algorithms and statistical predictive models.
  Key Achievements:
- Established ICF's Responsible AI and AI Governance Framework across the entire organization.
- Lead a group of senior data scientists in conducting various HHS initiatives in Medical Fraud Detection, exploring Deep Graph Learning for Risk Diffusion using DGL, DTW Multiple Time Series Anomaly Detection, Topic Modeling, and multiple data visualization tools.
- Led a team of data scientists in a pilot project toward automatic classification of COVID compliant documents, leveraging custom LLM Transformers using HuggingFace.
- Involved in development of an enterprise data strategy and implementation plan by assessing current state of Data and Analytic at Consumer Product Service Commission (CPSC) with the Center of Excellence, GSA.
- Wrote a Future State Analytic Platform document describing the recommended strategy for the next 5 years toward a new cloud-based Data/Analytic collaborative architecture.
- Spearheaded an initiative geared towards building and expanding a HHS Knowledge Graph on the AWS cloud. Leveraged pySpotLigth
- to perform Entity extraction and Linking via DBPedia, designed the ontology and implemented prototype on AWS Neptune Triples Store.

Founder   01/2006 to Current
HoloMathics, LLC

- Founded HoloMathics, a consulting and R&D Virginia Company with Big Data Analytics; currently acting as interim CEO and coordinator of the Team.
- Overseeing successful delivery of operations including Research (Topological & Algebraic Models of Social Interaction), Services (Consulting, Analysis, and Advice), and Products.
  Key Achievements:
- Provided critical expertise in the development of a radically new methodology for detecting fraud at IRS; the deep learning architecture leverages StellarGraph, a Keras library to perform various tasks such as sub-graph classification and link prediction.
- Designed and implemented a social platform which uses in the background a social recommendation engine I have invented, using advanced Graph Mining and DataBricks Spark, as well as a new Social Data Model based on hyper-graphs.
- Worked 2 years for the Department of Information Technology of George Washington University to build a pilot Research as Service Infrastructure (RaaSP) on the Azure Cloud, providing expertise on complex analytics at scale with Databricks Spark, Azure data Lake, and Azure Machine Learning (AML).

Data/Analytics Architect Consultant 10/2017 to 12/2018
GWU Department of Information Technology

- Helped the Division of Information Technology (DIT) of GWU to migrate researchers' data, applications, and activities to Azure cloud.
- Provided leadership to design and implement FABRIC, a security compliant Azure-based platform for biomedical research; the project included Blob and Azure Data Lake storage, configuring various analytic tools such as Spark DataBricks, Azure Workspaces, Azure Data Factory, Cloud Automation, and Python Web Interface.
- Demonstrated at Children's Hospital usage of Scala Databricks Notebooks for analyzing patients' data sets.

Big Data Analytics Consultant 04/2014 to 10/2017
FINRA

- Led an organization-wide effort geared towards establishing a Semantic Web for FINRA, helping Insider Trading analysts to identify suspicious tribe behavior around critical market events. Knowledge Graph was implemented using StarDog.
- Worked in the area of Big Financial Data Patterns on the AWS Cloud, achieving a complete overhaul of financial patterns implementation at FINRA: from SQL-based queries to distributed procedural / functional code.
- Explored the use of Graph Databases and Graph Engines to better handle financial data processing.
- Spearheaded several R&D initiatives related to Distributed Machine Learning for Huge Sets of Data, including a pilot collaboration project with George Mason University: tribe analysis with Spark communities' descriptions in large financial networks.
- Designed and implemented a scalable community detection algorithm using Scala and GraphX over Apache Spark.

Lead Community Architect 12/2011 to 02/2014
Virtusa

- Acted as Community Platform Architect for Scripps Networks, Digital, leading an on-shore and off-shore team of product evaluation engineers, and recommending new tools to enhance the community platform.
- Evaluated Community Platform Solutions including Hive, KickApps, and Echo, social login tools such as Gigya and Janrain, social widgets such as RealTidbits, API Managements platforms such as WSO2, Mashery, 3Scale, and Apigee.
- Created metrics, reports and summaries regarding team's findings, and proposed alternatives.
- Assisted Director of Engineering in various high-level architectural tasks - e.g., security protocols such as Oauth2 and SAML for client2service and service2service secure communications.
- Participated in a number of related activities to promote engineering processes and architectural improvements to current Community Platform.

Lead Architect, Social Graph 11/2010 to 10/2011
ReachLocal

- Involved in developing and enhancing ReachLocal's ReachCast, a web presence platform that helps small business reach local consumers, focusing on the connection between ReachCast and Facebook, as well as the visual web presence summary report pages.
- Designed, developed, and tested a Grails module for automatically creating albums and uploading / updating photos on a targeted Facebook page, using restFB, a java wrapper around the Facebook Graph AP.

R&D Manager 02/2008 to 06/2008
Intelligenx (Prague)

- Provided technical assistance on local search optimization developed prototype for enabling Facebook users to connect with a local search engine and provide user's product recommendations.
- Lead the R&D Team on a number of new directions in local search, including automated key-words extraction from web ads using Nutch /Hadoop.

Senior Research Engineer, Analytics & Search Group 08/2006 to 01/2008
AOL LLC

- Designed and implemented a website visualization engine aimed at monitoring web crawlers' activity.
- Conducted research on community-enhanced search engines.
- Co-developed a web application written in java and python which clustered user's queries using NMF factorization and other clustering / classification techniques.

Director of R&D 05/2004 to 12/2005
Human Bionics, LLC

- Managed a group of senior researchers and developers working at a disruptive technology in the area of bio-adaptive, intelligent human-computer interfaces.
- Designed and developed a near real-time EEG classifier using Lehmann Neural Networks, to assess attention level of subjects immersed in high-pace execution tasks.
- Coauthored two successful SBIR proposals on innovative methods in the areas of Intelligent Team Training and Intelligent Malicious Intent Detection.
- Coauthored three research papers in the area of Augmented Cognition that were accepted for publication in the Proceedings of the International Conference of Human-Computer Interfaces, Las Vegas, 2005.

Adjunct Professor of Computer Science
University of Maryland University College (UMUC)   02/2002 to 12/2006
George Mason University (GMU)   03/2002 to 06/2006
- Taught advanced undergraduate courses on Logic for CS, Software Engineering Practices, Compiler Design, Object-Oriented Design and OpenGL/Computer Graphics, Software Safety, Data Mining and Data Warehousing.

Senior Developer (Contractor)   07/2002 to 01/2004
General Services Agency (GSA)
- Designed, coded, and tested an enterprise-level, mission-critical Web Text Search Engine based on the open-source Jakarta Lucene Project, Oracle 9 and iPlanet J2EE Server 6.

AI Architect   04/2000 to 12/2001
Concannon Technologies, Inc
- Designed and developed a rule-based multi-media communication routing engine (telephony, e-mail, fax) based on Java Server Side Technology and Java WEKA ML library (association rules).

Senior Mathematician   01/1999 to 04/2000
netViz Corporation
- Conducted research on several algorithms for Automatic Graph Layout and 2D/3D visualization of multi-layers networks for Data Management.
- Designed and developed a MFC DLL that encapsulated AGD 1.01, a C++ library for graph layout; wrote a CORBA IDL wrapper around the layout module.

Software Engineer II   04/1998 to 12/1998
The Intelligent Systems Group, Datamat Systems Research, Inc
- Developed 3D knowledge visualization landscapes for rules inferred using C4.5 decision Trees with the commercial C++ Visualization Library In3D and built a MFC framework for Infer View Decision Support System, sponsored by the BMDO.

R&D Researcher/Developer   05/1997 to 03/1998
Graphical Media Arts, Inc
- Helped develop an innovative Video Compressor, sponsored by the Army Research Labs.
- Performed research in Data Compression using MATLAB 5 & its Toolboxes (Image Processing, Neural Networks, Wavelet Transform).
- Co-authored a successful SBIR Proposal on the combined usage of wavelets analysis and hierarchical neural networks in early breast cancer detection.

Education

Ph.D.: Mathematics
CUNY Graduate School - New York, NY
GPA: 3.75/4.0

Laurea (Bachelor): Mathematics
University of Pisa - Pisa, Italy

Certifications

- **Open-Source Intelligence Certification** | Udemy
- **Azure DP-100 ML Prep Certification** | Udemy
- **AWS Solutions Architect Associate: Architecture & Tools** | Skillsoft

Languages

English:	C2	**Italian**:	C2
Fluent		Native	
French:	B2	**Spanish**:	B2
Upper intermediate		Upper intermediate	
German:	B1		
Intermediate			

Additional Information

- Status: Dual Citizen (USA, Italian)
- Clearances: IRS, HHS

References

Available upon request.