Pietro Cavallo

Machine Learning Engineering Manager,
Babylon Health

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Work Experience

June 2018 – Present
Machine Learning Engineering Manager – Applied Machine Learning Team at Babylon Health, London, UK
As engineering manager: created from scratch a team of 7 machine learning engineers to build a variety of products in the field of natural language understanding and speech recognition.
As tech lead for the Input squad: guided the technical effort regarding the input understanding of Babylon's virtual assistant, including intent recognition, input anonymisation and translation, model deployment and clinical validation.
People Management, Deep Learning, NLP, Python, OOP, Architecture Design, Agile

December 2017 – June 2018
Machine Learning Scientist – ML/NLP Group at Babylon Health, London, UK
Research projects: investigating the use of attention on relational graph convolutional networks (GCNs), sentence representation using GCNs on syntactic parse trees.
Engineering projects: lead the re-architecting of Babylon's medical chatbot (medical device class I) to scale up and support new media, lead the voice integration to Babylon's products.
Deep Learning, Graph Convolutional Neural Networks, NLP, Python, OOP, Architecture Design, Agile

June 2015 – December 2017
Software Engineer - Data Analysis Group at MathWorks, Cambridge, UK
In charge of developing and maintaining data analytics products, such as neural networks and deep learning toolbox, machine learning apps and curve fitting toolbox. Focused on offering new deep learning tools for MATLAB as main designer and developer of convolutional neural networks. Working in an Agile environment in every phase of the development cycle, including requirement analysis, functional and architectural design, implementation and testing.
Deep Learning, Neural Networks, Data Analytics, Computer Vision, Machine Learning, MATLAB, C++, Java, OOP, Design Patterns, UML, Unit Testing, Test Driven Development, Agile, Perforce

December 2013 – June 2015
Software Engineer - Engineering Development Group at MathWorks, Cambridge, UK
Worked on a variety of software development projects demonstrating strong technical skills, initiative and leadership. Resolved complex customer queries in a fast-paced environment. Implemented and maintained complex software architectures following Agile methodologies and modern software engineering principles. Projects included: low level optimization of MATLAB graphics rendering engine using C++11, a financial data visualization app for Bank of England and new features for a machine learning classification app.
MATLAB, C++11, OOP, Design Patterns, UML, Code Performance, Test Driven Development, Agile, Perforce, Image Processing, Visualization, Machine Learning

June 2012 – December 2013 **R&D Engineer at Skin Analytics Ltd, Cambridge, UK**

Researched and developed new image processing techniques for automatic melanoma evaluation and skin tracking over time. Supervised by Prof. W. J. Fitzgerald and E. Punskaya from the University of Cambridge. Worked as a lead engineer and primary investigator in a rapidly expanding start-up to build and maintain the mole assessment technology, prototyped in MATLAB and then written in C++ and OpenCV. The result of the investigation was published as a European patent. Engaged in recruitment, customer relations and business development activities.

C++, OOP, Design Patterns, UML, MATLAB, OpenCV, Git, Image Processing, Machine Learning

June 2011 – May 2012 **Researcher at the University of Roma Tor Vergata, HITEG Group, V-Glove Project**

Developed sign recognition device for aeronautic gestures using signal processing and machine learning techniques. Project funded by the National Aeronautics. Co-Supervisor of BA Theses: “Classification Methods for Real Time Sign Language Alphabet Recognition” and “Static Sign Language Recognition Using Minimum Distance Classifiers”.

C++, OOP, UML, Signal Processing, MATLAB, Machine Learning

Higher Education

September 2009 – June 2011 **M.Eng. in Software Engineering, Major in Intelligent Systems at the University of Roma Tor Vergata, Italy**

Thesis: “Dynamic Gestures Recognition of Italian Sign Language Using Wavelet Analysis and Support Vector Machine"

Grade: 110/110 cum laude

January 2010 – June 2010 **Erasmus Student at the University of Bergen, Bergen, Norway**

Courses: Digital Image Processing, Complexity Theory

January 2004 – June 2008 **B.Eng. in Software Engineering at the University of Roma Tor Vergata, Italy**

Thesis: "Implementation of New Methods of Analysis Using Neural Networks for Brain Computer Interface"

Grade: 110/110 cum laude

Selected Publications and Patents

[1]. "Relational Graph Attention Networks", D. Busbridge, D. Sherburn, P. Cavallo, N. Y. Hammerla, https://arxiv.org/abs/1904.05811

[2]. "Method and System for Extracting Information from Graphs", Patent Application

[3]. "Flexible response dialogue system through analysis of semantic textual similarity", Patent Application

[4]. "Semantic Graph Traversal for Recognition of Inferred Clauses within Natural Language Inputs", Patent Application

[5]. "Deep Learning with MATLAB and Multiple GPUs", S. Moulder, T. Sheridan, P. Cavallo, and G. Rossini, Deep_Learning_in_Cloud_Whitepaper.pdf

[6]. "Skin Image Analysis", European Patent Application No. 12192126.6

[7]. “Conversion of Sign Language to Spoken Sentences by Means of a Sensory Glove”, P. Cavallo, G. Saggio, Journal of Software, Vol 9, No 8, ISSN 1796-217X.

[8]. “Gesture Recognition and Classification for Surgical Skill Assessment”, G. Saggio, G. L. Santosuosso, P. Cavallo, IEEE International Symposium on Medical Measurements and Applications, MeMeA 2011, Bari, Italy.

[9]. "Comparison of Different Classifiers on a Reduced Set of Features for Mental Tasks-Based Brain Computer Interface", G. Saggio, P. Cavallo, M. G. Marciani, L. Bianchi, G. Susi, G. Costantini, BIOSIGNALS 2010, Valencia, Spain.

Other papers available on request.

Technical Skills

- Programming languages: Python, MATLAB, C, C++, Java
- Object Oriented Programming patterns and principles
- Mathematics, including linear algebra, calculus, and statistics
- Data analysis and machine learning experience, including deep learning
- Image processing and computer vision knowledge, including experience using OpenCV library
- Natural language processing knowledge
- Version control systems such as Perforce and Git

Languages

- **Italian** (native)
- **English** (proficient)
- **Spanish** (fluent)

Other Interests

- Band experience playing guitar, bass and drums with 2 CDs published.
- Lead organizer of B.E.S.T. (Board of European Students of Technologies) Rome Tor Vergata, from year 2009 to 2011.
- Finalist of National Mathematical Olympiad, Italy 2003.
- Active member of the CouchSurfing community, administrator of the Cambridge CouchSurfing group.