MARCO CHIARELLI - RESUME

My name is Marco Chiarelli. In October 2015, I obtained an Undergraduate Degree, cum Laude, in Ingegneria dell'Informazione at the University of Salento, with a degree thesis in Systems Theory titled: "Principal Component Analysis (PCA) and Structural Properties of Linear Systems". In January 2018 he obtained the Master's degree, cum Laude, in Computer Engineering at the University of Salento, with a degree thesis in High Performance Computing titled: "Advanced approaches to improve performance of numerical models on new HPC systems", concerning the analysis and optimization of sequential models, focusing at their uses in parallel contexts.

Since March 2018 I've been working with the Advanced Scientific Computing (ASC) division of the CMCC. My first research activities involved climate models optimization, in particular the NEMO ocean model (Nucleus for European Modelling of the Ocean), and also sequential analysis and optimization techniques.
The research activities that I've carried out at the Advanced Scientific Computing (ASC) division of the Euro-
Mediterranean Center on Climate Change (CMCC), concern:
- Climate models optimization, in particular the NEMO ocean model (Nucleus for European Modelling of
the Ocean). For this optimization, sequential analysis of the code and advanced techniques (for memory-bounded kernels) have been successfully applied, improving the NEMO performance;
- High Performance Data Analytics (HPDA). In particular, analysis and optimization of the Ophidia data analytics framework: http://ophidia.cmcc.it/ ;
- Investigation into the use of Neural Networks as a tool for climate and weather forecasts and their use in NEMO, downscaling models etc. Knowledge of the main framework, architectures and tools for Deep
Learning.

In my PhD in Scienze e Tecnologie Biologiche ed Ambientali at the Department of Biological and Environmental Sciences and Technologies (DiSTeBA), I've studied and investigated the use of Machine Learning / Deep Learning techniques for Climate Change applications. In particular
these techniques are currently applied to the following use cases:
- Time series analysis and prediction (Sea Level Forecast);
- Downscaling;
- Hybrid Modelling;
- Tropical cyclones prediction;
- Extreme Weather Events.

During my last PhD year, from March 1st 2022 to May 1st 2022, I've been at the Columbia University in the City of New York at the Earth and Environmental Engineering Department as Visiting Scientist, in order to collaborate with Prof. Pierre Gentine on an enhanced climate-change-aware version of the Downscaling of 2m temperature over the EURO-CORDEX domain scientific use-case, based on the use of Residual CNN (Convolutional Neural Networks).

My skills include a good knowledge of the high performance computing architectures, optimal knowledge of programming languages for scientific and general purposes and good knowledge of Machine Learning framework, architectures and tools.

My publications / journal articles during my PhD cycle have been the following:

"*An Artificial Neural Network-Based Approach for Predicting the COVID-19 Daily Effective Reproduction Number Rt in Italy*" ; Andrea Gatto, Valeria Aloisi, Gabriele Accarino, Francesco Immorlano, Marco
Chiarelli, Giovanni Aloisio ; MDPI AI - Artificial Intelligence ; MDPI (2022)
doi.org/10.3390/ai3010009

"*MSG-GAN-SD: A Multi-Scale Gradients GAN for Statistical Downscaling of 2-Meter Temperature over the EURO-CORDEX Domain*" ; Gabriele Accarino, Marco Chiarelli, Francesco Immorlano, Valeria Aloisi,
Andrea Gatto, Giovanni Aloisio ; MDPI AI - Artificial Intelligence ; MDPI (2021)
doi.org/10.3390/ai2040036

"*A multi-model architecture based on Long Short-Term Memory neural networks for multi-step sea level forecasting*" ; Gabriele Accarino, Marco Chiarelli, Sandro Fiore, Giovanni Aloisio ; Future Generation
Computer Systems ; Elsevier (2021)
doi.org/10.1016/j.future.2021.05.008

Lecce, 15/11/2022

Marco Chiarelli