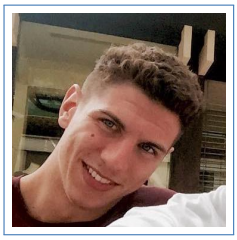

Emanuele Ghelfi

Curriculum Vitae

Overview

I received the M.Sc. Degree in Computer Science and Engineering at Politecnico di Milano with 110L/110 in December 2018. In particular I followed the Artificial Intelligence track. The AI track includes courses like Game Theory, Machine Learning, Robotics, Image Analysis and Computer Vision, Autonomous Agent and MultiAgent Systems and Natural Language Processing.
My master thesis is located in the Machine Learning field, and more precisely in the Reinforcement Learning field.
My current role is Staff Algorithm Engineer @ VisLab, Ambarella. I am currently involved in topics like Object Detection, Tracking and Forecasting; Sensor Fusion; Sensor Calibration; Radar Processing.

Education

2016–2018 **M.Sc. Computer Science and Engineering**, *Politecnico di Milano*, Artificial Intelligence Track, *110L/110*.
Thesis: "Reinforcement Learning in Configurable Environments: an information theoretic approach" (accepted at ICML 2019). Supervisors: Marcello Restelli, Alberto Maria Metelli.

- Thesis: politesi.polimi.it/handle/10589/144736
- Code: github.com/albertometelli/remps
- Slides: slideshare.net/EmanueleGhelfi/reinforcement-learning-in-configurable-environments

2013–2016 **Bachelor Degree in Computer Science and Engineering**, *Politecnico di Milano*, Cremona, *110L/110L*.

2008–2013 **Scientific High School Diploma**, *Liceo Scientifico Tecnologico A. Berenini*, Fidenza, *100/100*.

Experience

2023–present **Staff Algorithm Engineer**, VisLab, Ambarella, Parma.

2021–2023 **Senior Algorithm Engineer**, VisLab, Ambarella, Parma.

2020–2021 **Machine Learning and Computer Vision Engineer**, Deep Vision Consulting, Modena.

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slideshare.net/EmanueleGhelfi

2018–2020 **Machine Learning and Computer Vision Engineer**, Zuru Tech Italy, Modena.

At Zuru Tech Italy I held the role of Machine Learning and Computer Vision Engineer.
I was involved in tasks like:

- Anomaly detection
- Generative Adversarial Models (GANs) applied to various problems
- Computer Vision applied to industrial processes
- Sequence Modeling through Recurrent Models (LSTM)
- Machine Learning models deployment on Google Cloud Platform

For all these tasks I covered the steps of solution design, algorithm implementation, algorithm evaluation, solution deployment.
I dealt with computer vision tasks like:

- Stitching and Photogrammetry: I used techniques like stereo vision, bundle adjustment 3D-2D and bundle adjustment 2D-2D.
- Quality control: in this context I used methods like semantic segmentation, watershed, and other image processing techniques.

Languages:

- Python for the ML training part
- C++ for the final deployment in the production line

2016 **Mobile Development**, Xonne, Parma.

Research and Development about Unity3D, GearVR and Cardboard. Mobile development for Android.

2015–2016 **Web Development**.

Front-end and Back-end development with AngularJS for a website of a cultural event in Vernasca. Development and deployment of a web server in Python with Flask.

2015 **Student Apprentice**, Xonne, Parma.

Development of Android application with access to REST services and persistence of data. Research regarding Unity3D for game development and Augmented Reality.

2014 **Student Apprentice**, Politecnico di Milano, Cremona.

Development of a WebApp for News' visualization.

Publications

28-06-2019 **A Survey on GANs for Anomaly Detection.** arXiv e-print. arxiv.org/abs/1906.11632.

27-06-2019 **Adversarial Pixel-Level Generation of Semantic Images.** arXiv e-print. arxiv.org/abs/1906.12195.

01-05-2019 **Reinforcement Learning in Configurable Continuous Environments.** Proceedings of the 36th International Conference on Machine Learning (ICML 2019). proceedings.mlr.press/v97/metelli19a.html.

Supervision of Master's Students

2024 Lorenzo Cipelli, **"Deep Learning-based Multi-Modal Sensor Calibration"**

Talks

02-09-2019 **Deep Diving into GANs: From Theory to Production with TensorFlow 2.0.** EuroSciPy 2019, Bilbao, Spain.

- EuroSciPy: pretalx.com/euroscipy-2019/talk/Q79NND/
- Github: github.com/zurutech/gans-from-theory-to-production
- Slides: slideshare.net/EmanueleGhelfi/euroscipy-2019-gans-theory-and-applications

04-05-2019 **Deep Diving Into GANs: From Theory To Production.** PyConX 2019, Florence, Italy.

- PyConX: pycon.it/conference/talks/deep-diving-into-gans-form-theory-to-production
- Github: github.com/zurutech/gans-from-theory-to-production
- Slides: slideshare.net/EmanueleGhelfi/gan-theory-and-applications-143737572

Summer Schools

07-2024 **ICVSS: International Computer Vision Summer School.** `https://iplab.dmi.unict.it/icvss2024/`

06-2020 **RegML: Regularization Methods for Machine Learning @ MaLGa.** `https://lcsl.unige.it/courses/regml/regml2020/`

Awards

2013 Scholarship "Percorsi di Eccellenza" during Bachelor Degree at Politecnico di Milano. Scholarship for worthy students.

Projects

2018 **Learning to Run**, *Deep Learning Project*.

Topics: Deep Reinforcement Learning.
The project takes inspiration from the 2017 NIPS Competition: crowdai.org/challenges/nips-2017-learning-to-run.
In this competition, you are tasked with developing a controller to enable a physiologically-based human model to navigate a complex obstacle course as quickly as possible. You are provided with a human musculoskeletal model and a physics-based simulation environment where you can synthesize physically and physiologically accurate motion. Potential obstacles include external obstacles like steps, or a slippery floor, along with internal obstacles like muscle weakness or motor noise. You are scored based on the distance you travel through the obstacle course in a set amount of time. The aim of the project is to study the problem and try to apply Deep Reinforcement Learning algorithms to replicate results of the top teams.

- Code: github.com/MultiBeerBandits/learning-to-run
- Video: youtube.com/watch?v=HVOrhxypOGg
- Slides: slideshare.net/EmanueleGhelfi/learning-to-run-138950609

2018 **Computer Vision for Computer Art. A pencil writing on a virtual plane**, *Image Analysis and Computer Vision Project*.

Topics: Image Analysis, Feature Extraction, Tracking, Camera Calibration, 3D reconstruction.
Wouldn't be great to write or draw on any surface, without the need of ink, and obtain the result in digitalized format? The task of this project is to develop an algorithm that, given a video of someone drawing using a pen without ink, recovers the 3D trajectory of the pencil tip. Given that, it is possible to reconstruct the drawing, by simply keeping the part of the trajectory near the writing surface. The project is implemented in MATLAB.

- Code: github.com/EmilianoGagliardiEmanueleGhelfi/inkless-painting
- Video: youtube.com/watch?v=U7XAzXeBx-U

2017 **Recommender System Challenge @ Polimi: Music Recommendation**, *Recommender Systems Project*.

Topics: Machine Learning, Recommender System, Personalized Recommendation.
I took part to the annual Kaggle competition on Recommender Systems held by Politecnico di Milano in 2017. That year topic was music recommendation, so we implemented and trained several Machine Learning algorithms to suggest songs to users based on their tastes. We placed among the best teams in the competition and we were invited to present our approach and solutions to the recommendation problem[1].
We used Python, Numpy/Scipy, Jupyter Notebooks and C++ as technology tools to efficiently implement our ideas.
[1] https://www.slideshare.net/EmanueleGhelfi/recommender-system-challenge

- Code: github.com/MultiBeerBandits/recsys_challenge_2017
- Slides: slideshare.net/EmanueleGhelfi/recommender-system-challenge

2017 **CNN Quantization - Performance Evaluation**, *Advanced Computer Architecture Project*.

Topics: Convolutional Neural Networks, Quantization, Performance, Cache, Tensorflow, Caffe.

For real world application, convolutional neural network(CNN) model can take more than 100MB of space and can be computationally too expensive. Therefore, there are multiple methods to reduce this complexity in the state of art. Ristretto is a plug-in to Caffe framework that employs several model approximation methods. For this project, first a CNN model is trained for Cifar-10 dataset with Caffe, then Ristretto will be used to generate multiple approximated versions of the trained model using different schemes. The goal of this project is the comparison of the models in terms of execution performance, model size and cache efficiency in the test and inference phase. The same steps are done with Tensorflow and Quantisation tool. The quantisation schemes of Tensorflow and Ristretto are then compared.

- Code: github.com/EmilianoGagliardiEmanueleGhelfi/CNN-compression-performance
- Slides: slideshare.net/EmanueleGhelfi/cnn-quantization

Competences

Programming Languages.

- Python
- C++
- C
- Matlab
- Java
- C #

Machine Learning Frameworks.

- PyTorch
- Tensorflow

Other Competences.

- NumPy
- OpenCV

Languages

Italian Mother tongue

English Intermediate *level B2 with TOEIC certification (475 Listening + 470 Reading = 945/990)*

Privacy

In compliance with the Italian legislative Decree no. 196 dated 30/06/2003, I hereby authorize you to use and process my personal details contained in this document.