Seminario per il Corso di "Knowledge Engineering and Artificial Intelligence"

Ingegneria Informatica Magistrale

Docente: Prof. Beniamino Di Martino

The Generative Power of Deep Learning: Variational Auto-Encoders and Generative Adversarial Networks for scenario generation

14 Dicembre 2023 – Ore 10:30-13:00
Dipartimento di Ingegneria - Aula 1C - Via Roma 29, Aversa

In recent years Deep Learning (DL) has witnessed remarkable advancements in understanding complex data representations, and its applications have permeated various domains. The talk will start with a brief introduction to the fundamentals of DL, providing a foundational understanding for exploring generative DL models. Generative models empower machines to create, innovate, and generate new content autonomously. We will focus our attention on prominent techniques such as Variational Auto-Encoders (VAE) and Generative Adversarial Networks GAN).

I will then discuss our first steps in developing a GAN model that, using real data collected from sensors, is capable of learning the multivariate joint probability distribution of link speeds in a road network. This work originated by the fact that when making decisions with lasting implications over a medium to long timeframe, it is essential to consider not only the most probable scenario, possibly obtained through a forecasting model but also a wider range of potential outcomes.

The proposed model has shown its ability to generate samples that preserve correlations among variables, while faithfully representing the empirical marginal distributions. To enhance the performance of our GAN model, a Variational Auto-Encoder (VAE) for pre-training the generator network is employed. Some preliminary results, conducted on benchmark datasets, will be presented.

Relatore

Prof. Enza Messina
Università di Milano Bicocca

Organizzatore e Moderatore

Prof. Beniamino Di Martino
Università degli Studi della Campania Luigi Vanvitelli

Link al Teams:
https://teams.microsoft.com/l/meetup-join/19%3a475f3fb8f4234b509b54d90956d22f18%40thread.tacv2/170205738925
5?context=%7b%22Tid%22%3a%228f547aef-14d7-49ca-a4d4-51a6c5cb92c1%22%2c%22Oid%22%3a%2224758d6f-12
cb-45cf-a468-3b11ac6282d3%22%7d