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Large Language Models for Telecom

Entreprise/Laboratoire : Laboratoire des signaux et systèmes (L2S), CentraleSupélec

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Abstract: "The present project will focus on the employment of generative artificial intelligence and particularly of large language models for building sustainable 6G networks. That is in response to the traffic evolution as well as the evolution of the energy availability and the energy surplus created by renewable energy sources."

Motivation: The evolution of generative artificial intelligence (GenAI) constitutes a turning point in reshaping the future of technology in different aspects. Large language models (LLMs), a subfield of GenAI, are envisioned to open a new era of autonomous wireless networks, in which a multimodal large model trained over various Telecom data, can be fine-tuned to allow for the realization of artificial general intelligence (AGI)-empowered wireless networks.

Objective: The present project will explore how to employ existing Large Language Models (LLMs), e.g. Falcon LLM, generative pre-trained transformer (GPT)-2/3/4, Bidirectional Encoder Representation from Transformer (BERT), large language model Meta AI, as well as visual generative models, e.g., DALL-E and Contrastive Language-Image Pre-Training (CLIP) for the realization of autonomous wireless networks, able to adjust their energy consumption and their utilization of resources (i.e. base stations, data centers, etc.).

Work plan: In this context, the students are going to: (a) study the literature on LLMs for telecom, (b) familiarize themselves with existing well known LLMs, (d) employ LLMs to adjust the energy consumption and resource utilization of simulated wireless networks..

Expected outcomes: ((a) One initial report focusing on literature review and the state of the art, (b) one intermediate report on the examined LLMs, (c) one final report with their results with well documented source code

References:

- L. Bariah, Q. Zhao, H. Zou, Y. Tian, F. Bader, M. Debbah, " Large Generative AI Models for Telecom: The Next Big Thing?," https://arxiv.org/abs/2306.10249
- Y. Wang, Z. Gao, D. Zheng, S. Chen, D. Gündüz, and H. V. Poor. "Transformer-Empowered 6G Intelligent Networks: From Massive MIMO Processing to Semantic Communication", https://arxiv.org/abs/2205.03770