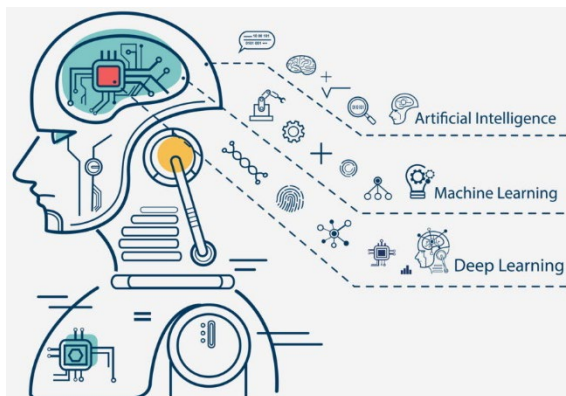




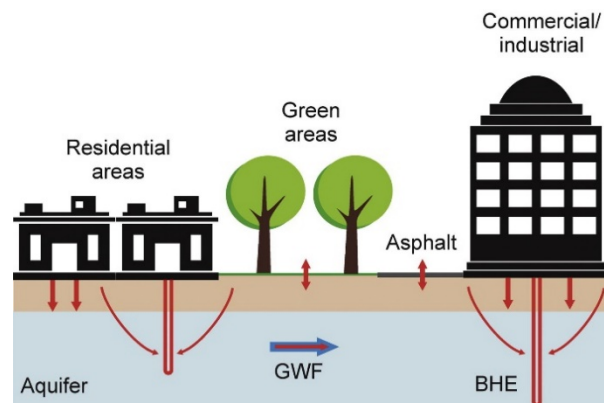
Application of machine-learning techniques for borehole heat exchangers simulation

About

The use of low-enthalpy geothermal energy is concentrated on the subsurface (a few hundred meters in depth). So-called ground heat exchangers or BHEs (borehole heat exchangers) are installed most frequently. These exchange heat with the ground by circulating a fluid through pipes installed in vertical boreholes. BHEs are usually connected to heat pumps defining the so-called GSHPs (ground source heat pump systems). Over the past decades, the number of BHEs has increased significantly, especially in cities in central and northern Europe, the United States, and China. With their number and density growing, there is also a growing interest in improved simulation techniques to characterize and predict the thermal response in the ground. While most of the research on BHEs modeling has focused on numerical or analytical methods that have a physical basis, it sounds that data-driven methods have not yet been well explored in this area of research. The main goal of this project is to take advantage of significant advances in artificial intelligence and novel machine learning techniques to further improve the simulation procedures of BHEs during their long-term operational lifetime and to better address socio-economic and environmental issues.



Source: www.atriainnovation.com



Tasks

- Literature review on the previous works
- Implementation of available machine learning algorithms in the context of BHEs
- Comparison of the results with classic analytical models and making a critical discussion

Requirements

- Hands-on experience with programming languages (preferably Python)
- Good knowledge in hydrogeology and basic mathematical skills

Supervisors

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