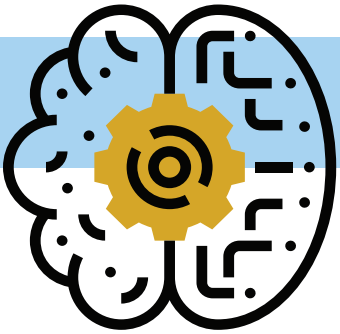


Artificial Intelligence

Artificial intelligence (AI) is a branch of branch of computer science focused on developing machines that behave and reason like humans. The many different AI techniques can be categorized into four groups based on the human behaviour or reasoning process that each technique mimics.

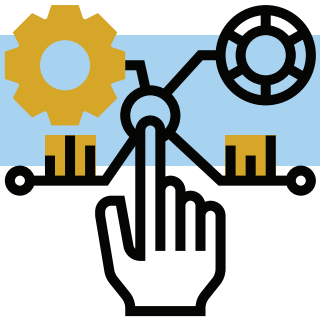
Predictive modeling techniques mimic the ability of the human brain to learn from available data and predict the behaviour of real-world systems. Researchers in the IRC program have used predictive modeling techniques to predict construction labour productivity and project and organizational performance, evaluate crew motivation, and assess risk.

Decision-making techniques mimic the ability of the human brain to consider multiple criteria and objectives when making a decision. Researchers in the IRC program have used decision-making techniques to determine the most important competencies on construction projects and plan risk responses.

Natural language processing techniques mimic the ability of the human brain to process natural language and extract useful information from casual conversation. Natural language processing is most often used in software engineering applications like virtual assistant programs (e.g., Siri or Google Assistant).

Image processing techniques mimic the ability of the human brain to process images and extract useful information from visual observation of the real world. Image processing is used in a variety of advanced electrical and software engineering applications, including self-driving cars and autofocus cameras.

Simulation



Simulation techniques use computers to model construction projects, running them virtually in order to predict the behaviour and outcomes of projects. There are different types of simulation techniques suitable for modeling different kinds of construction processes or projects.

Discrete event simulation (DES) is suitable for modeling repetitive construction processes where a certain number of tasks are repeated a certain number of times. Researchers in the IRC program have used DES to model the process of manufacturing modules for heavy industrial projects.

System dynamics (SD) is suitable for modeling performance indicators on construction projects, which change over time under the effect of numerous interacting factors. Researchers in the IRC program have used SD to model construction productivity and assess project risks.

Agent-based modeling (ABM) is suitable for modeling construction systems (i.e., processes or projects) where the output is driven by various agents who demonstrate different types of behaviour. Researchers in the IRC program have used ABM to evaluate crew motivation and predict overall crew performance.