Graph algorithms proved to be useful in a number of real-life applications as well as in the development of several branches of science. For example, graphs are a useful discrete tool in modeling certain types of physical environments like street maps, networks or topology of buildings. On the other hand, graph-theoretic modeling can be applied to more abstract structures like social networks, timetabling, relations between objects or production processes.

This project aims at the development of algorithmic methods for locating objects in some abstract search spaces. More precisely, we model such spaces in a graph-theoretic way, so the search process occurs on some specifically constructed graph. Within the project we investigate several different searching models and their selection is dictated by potential applications. An example of such application lies in recently discovered connection between some search models and the area of interactive/machine learning. In this case, a machine learning process needs to learn by interacting with the user. The interaction is modeled as a search process: the subsequent questions that the system presents to the user are dictated by the underlying graph structure. It is worth to mention that the algorithmic method works in such a way that it is not visible to the user: it is the system that uses the graph-theoretic modeling to learn the desired information as quickly as possible, i.e., by asking as few queries as possible. The user on the other hand, only receives some types of queries like questions about his or her preferences.

A motivation behind studying this particular problem lies in the fact that it is very fundamental in computer science: it is related to algorithms that find particular data or object in structures that can be modeled via graphs. Also, the machine learning area has a wide range of every day life applications and hence it is intriguing how much can be achieved in this direction by applying such graph-theoretic methods. Another real-life analogue of these types of problems is a person navigating in a city, where at any intersection the person may perform a query which, as a result, points the person in the right direction to the desired destination. The goal is to arrive at the destination and ask as few queries as possible in the process.