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## **AI for Robotics Exercise 9**

### **Task 9.1 Theoretical questions**

**a) Explain why predictions might be necessary for a robot (4 points).**

Predictions play an important role in improving a robot's capabilities. For instance, accurate predictions enable robots to find optimal paths and minimize energy consumption during movement. By predicting future sensor readings like obstacles, robots can plan efficient and safe paths. Furthermore, predictions help with resource management, e.g. managing the robot's battery consumption and predicting when and where it needs to recharge. In addition, robots can avoid inefficient actions and predict beneficial outcomes by relying on accurate predictions.

**b) Explain the difference between prediction and forecast (3 points).**

Prediction involves making an estimate of a specific outcome based on input variables, often with a focus on a specific situation.

Forecast, on the other hand, involves projecting future events and data over a longer period.

For example, in a self-driving car, a prediction model might predict the trajectory of a pedestrian stepping into the road(short-term event), while a forecast model might predict a traffic jam on the route over the next hour based on real-time traffic data and past patterns.

**c) Explain in your own words the concept of active inference (3 points).**

Active inference is a concept used to minimize uncertainty by updating beliefs based on sensory input and choosing actions that reduce future surprise. It involves updating a world model using sensory data and selecting actions that match with predicted outcomes. Essentially, active inference helps robots make informed decisions by balancing perception and action to minimize uncertainty.