# **Introduction to AI & Intelligent Product Development**

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**Mid-term Exam Supplement Paper**

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**Question 3**

**A learning agent** is an independent entity capable of leveraging its environment to enhance performance over time. Enhancing an agent's learnability involves ensuring sufficient training data, establishing precise objectives, employing reinforcement learning, and maintaining a balance between exploration and exploitation.

Learning Agent Example:

Imagine an autonomous entity that acquires knowledge from its environment to enhance its performance over time. It collects data from sensors, cameras, and GPS, and employs machine learning algorithms to analyze and comprehend the surroundings. Gradually, it gains expertise in making improved decisions such as lane changes, speed adjustments, and responding to traffic signals, ultimately refining its overall driving capabilities.

In the case of developing an intelligent system to greet students at an institute's entrance:

**Table-based agents** can be utilized by constructing a lookup table that links input stimuli to suitable greetings. The agent consults this table to select the appropriate greeting based on specific conditions.

Table-based Agent Example:

Suppose you have a digital assistant that greets visitors to a website. By utilizing a table-driven agent approach, you can create a mapping table that correlates different user inquiries with appropriate replies. For instance, when a user seeks information about shipping options, the agent can consult the table and provide the pertinent details. Likewise, diverse queries and corresponding responses can be defined in the table to handle various situations.

**Goal-based agents** can incorporate the objectives of greeting students, providing useful information, addressing inquiries, or offering assistance alongside greetings. The agent employs its knowledge and reasoning abilities to deliver personalized and pertinent greetings.

Goal-based Agent Example:

Consider an intelligent tutoring system intended to support students with their mathematics assignments. Alongside offering solutions, a goal-oriented agent can prioritize objectives like elucidating concepts, guiding problem-solving approaches, and delivering personalized feedback. The agent leverages its knowledge base to comprehend the student's progress, tailor its responses accordingly, and assist the student in attaining their learning goals.

**Utility-based agents** assign values to different greetings based on factors such as student preferences and contextual cues. The agent then selects the greeting with the highest utility value, maximizing overall student satisfaction.

Utility-based Agent Example:

Envision a virtual personal assistant that aids users in planning their daily activities. A utility-driven agent can assign scores to different options based on user preferences, time constraints, and contextual factors. For instance, when suggesting a restaurant for dinner, the agent takes into account aspects such as the user's culinary preferences, proximity, and user reviews to select the option with the highest score, maximizing the user's dining experience.

By combining these approaches, the intelligent system can greet students in a refined and personalized manner, taking into account their preferences, context, and specific objectives.