**Modified**

Okay, so let's now try to provide you with an overview of intelligent systems in general, at a high level. In this lecture, I would like to talk about intelligent systems in general and also look into why intelligent systems are increasingly becoming important in industries and businesses.

We also want to characterize intelligent systems and identify the kind of technologies and techniques that may be relevant in building intelligent systems. Then, we'll look into one paradigm of an intelligent system called intelligent agents, which has been used to view many AI systems.

Let's start with an intelligent system. The first question, of course, is if we want to classify a system as being intelligent, then we need to be able to answer the question: what is intelligence? The general consensus is that there are several ways to characterize intelligence, such as the ability to perform reasoning and solve problems.

If someone can perform reasoning to deduce new knowledge from what they already know and apply that knowledge and skills to solve problems, then they are considered intelligent. Another important characteristic is the ability to learn and adapt. Humans, for example, are not born with all the knowledge and skills considered intelligent.

They acquire these through learning and adapt to new situations using their existing knowledge and skills. Even if they've never encountered a situation before, they can apply their past knowledge and skills to the new problem.

People also associate intelligence with the ability to perform complex tasks. For instance, a mathematician solving mathematical problems, a skilled chess player winning against another skilled player, or a neurosurgeon performing brain surgery. These tasks indicate intelligence.

However, the question arises: what tasks can be considered complex? For example, assembling appliances in a factory, often done by industrial robots, might not seem complex. Complex tasks are those that typically require human intelligence to solve.

This provides a common definition of AI: systems that can solve problems requiring human-like intelligence. Another definition of intelligent systems is those that can adapt to changes in problems. Even when facing new problems, they can change their algorithms and data structures through automatic learning.

At present, very few machines can achieve this. In our unit, we consider systems displaying machine-level intelligence in terms of reasoning and often learning, but not necessarily self-adapting, as intelligent systems.

With this broad definition, many different types of systems are considered intelligent, from those solving problems using reasoning to those that learn from data or interactions with the environment to improve themselves.

Self-adaptation is not always required for a system to be intelligent.

**Summarise**

In this lecture, the focus is on providing an overview of intelligent systems and understanding their growing significance in industries and businesses. The lecture explores the characteristics that define intelligence, including reasoning, problem-solving, learning, and adaptation.

The concept of intelligence prompts the question: What constitutes an intelligent system? The consensus lies in its ability to reason, derive new knowledge, and apply it to solve problems. Equally vital is the capacity to learn and adapt. Humans, for instance, acquire knowledge through learning and adjust to novel situations by leveraging their existing expertise.

Intelligence is often associated with handling complex tasks, such as mathematicians solving intricate equations or skilled individuals excelling in chess or neurosurgery. However, the complexity criterion varies. While assembling appliances using industrial robots might seem routine, genuine complexity involves challenges necessitating human-like intelligence.

This lays the foundation for a shared definition of AI: systems adept at solving problems requiring human-like cognitive abilities. Another facet of intelligent systems involves adaptability. Despite encountering new challenges, these systems can modify their strategies and data structures through automatic learning—a rare capability in the current landscape.

Within this framework, an intelligent system embodies machine-level intelligence in reasoning and learning, even if self-adaptation isn't mandatory. This broad understanding accommodates various systems, encompassing those that use reasoning to tackle issues and those that enhance themselves through data-driven learning and interactions with their environment.

***Important***

**INTELLIGENT SYSTEM**

In this lecture I would like to talk about intelligent system in general. We would also look into why intelligence systems increasingly become important in industry and businesses. And then we look into one paradigm of intelligent system called intelligent agents.

**AN INTELLIGENT SYSTEM**

What is intelligence? The ability to perform reasoning and solving problems. Also one important characteristic which is the ability to learn and to adapt. These definitions of intelligent system will encompass most behaviour. Although self adapting is not necessarily one of the requirements for the system to be intelligent.

**Original**

Okay, so let's now try to go into providing you guys with an overview into intelligent system in general at a high level. So in this lecture I would like to talk about intelligent system in general and also we would like to look into why intelligence systems increasingly become important in industry and businesses. We also want to characterize intelligent systems and with that we identify the kind of technologies and techniques that may be relevant in building intelligence systems. And then we look into one paradigm of intelligent system called intelligent agents which has been used to view many AI systems. So let's start with an intelligent system. So the first question that of course if we want to classify a system being intelligent, then we need to be able to answer the question what is intelligence? So the general consensus is that there are a number of ways to characterize intelligence such as the ability to perform reasoning and solving problems. So if you can do some sort of reasoning in order to deduce a new piece of knowledge from what you have known before and also you apply such knowledge and skills to solve problem, then that person or that being is considered to be intelligent. Now, there are also one important characteristic which is the ability to learn and to adapt. So this is the very well known example that humans, when they were born, they don't necessarily have a number of ability that can be considered to be intelligent. So for instance, they lack knowledge, they lack skills, but then thanks to their intelligence, they are able to learn and acquire those knowledge and skills and also they are able to adapt to a new situation that arise. And so even if that new situation has never been encountered before, but they are able to use the knowledge and skills they have in the past in order to apply to the new situation, the new problem. And a lot of the time people also talking about intelligence imply the ability to perform complex tasks and these are when they typically talk about tasks such as a mathematician being able to solve mathematical problems or a very intelligent chess player is able to win a chess game against another very intelligent chess player. Or neurosurgery who's able to surgeon, who able to perform a surgery is on the brain of a patient. So these complex tasks indicates that the person who can perform them or the entity who can perform them is intelligent. Now, the question is clearly there are many tasks. So what tasks can be considered to be complex? For instance, the task of assemble some appliances in a factory, is that considered to be a complex task? Because many of these assembling tasks is currently being handled by industrial robots. And so can we consider these industrial robots that repeatedly perform some operations, some action in order to achieve the samples of these devices or appliances? Should we consider them as intelligent. So now the complex tasks that people typically associate with intelligent beings is the kind of task that require human intelligence to solve. And so that provide you with a very common definition of AI. If you search on the internet, you Google, you use Bing, you use Google to search for a definition of artificial intelligence, then typically this is the definition that you are going to get. This is also the definition of AI that was introduced by one of the great grandfathers of AI, sir Mavi Minsky, who developed the foundation of neural networks. Another definition for intelligent system is that these are the system that can adapt itself to deal with changes in the problem. So even when it encounters new problems is able to adapt itself and changing its algorithm, changing the data structure that it use in order to deal with these changes in the problem via process called automatic learning. This is actually not a trivial task and at the moment very few machines can do this at present. So in general in our unit we consider any system that displays some machine level intelligence in term of reasoning and a lot of the time using learning as well, but not necessarily self adapting to be an intelligent systems. With this sort of broad definition, then we accept many different type of systems as intelligent systems. Because the systems will be able to perform some problem solving and then using some sort of reasoning and some sort of solving the problem mechanisms, then we will consider them as an intelligent systems. Or if the system being able to perform some learning activities could be learning from a huge data set or learning from the actions it perform in the environment and then observe the changes in the environment and then through those observations, recognize the benefit or the harms that its actions will cause towards the objective that it would like to achieve. And then by those experiences in the environment is try to learn to improve itself, then we view those system as intelligent system as well. So in general, these definitions of intelligent system will encompass most behavior from reasoning, to solving problem, to dealing with complex tasks, to learning. Although self adapting is not necessarily one of the requirements for the system to be intelligent.