Core Unit 6: Artificial Intelligence

**Lecture 6A: The current state of artificial intelligence**

Good morning everyone. I wonder what your immediate reaction is when you hear the term ‘Artificial Intelligence’. Confusion? Excitement? Mistrust… or perhaps convenience? Well, according to recent studies public perceptions of AI are changing. And that’s not really surprising since society has quickly moved from a time when AI was conceptual- the realm of science fiction movies and mad scientists with white coats- to now, when it’s a reality. Well today, I’m going to be looking at the current state of AI. First of all, I will look at technological developments, and then I will consider limitations in how AI learns and how these could be overcome. Finally, I’ll briefly explore changing public opinions of AI.

Ok, so first let’s take a look at the technological changes that have taken place. Well, when trying to understand AI, we usually categorize it as weak and strong. Weak AI is what we see on a daily basis- unconscious systems that have a particular function- say operating your washing machine or a floor cleaning robot. Strong AI, on the other hand… that’s where the imagination comes into play- that’s about robots that have human characteristics- they replicate and potentially replace humans… I’m sure you’ve all seen the movies where robots take over the world.

So strong and weak… that’s the classic division. But according to the current literature, we’ve reached a point where the lines aren’t so clear- in fact it’s now much more like a continuum. A recent article by AI analyst Kathleen Walch explains that AI research has made impressive progress in various fields – for example, in the processing of images and speech, in the motor control of machines, and in playing games like chess. And even though we are still some way away, this is moving us closer to a strong form of AI. To illustrate this further, let me give you a more detailed example.

We can say that emotions are a unique characteristic of humans, at least they are a characteristic not shared by AI, right? Well, let’s think about how humans respond to emotions. What we do is process images that we have categorized. If we see a happy, sad, angry, surprised face, we know what that means because we’ve seen it a thousand times before. And then what? Well, we respond accordingly: we offer sympathy or congratulate using past experiences to judge our response. And robots can now do all of this too. According to industry expert Vidushi Meel, image recognition advances mean that through analyzing thousands of pictures robots can understand exactly how humans are feeling and can be taught to respond in a huge number of different ways. So I ask you… is this human?… Well it’s definitely somewhere on the weak-strong AI continuum right? But at the same time, we could say it’s definitely not human because it lacks real feeling or consciousness. Do you agree?

OK, well, that example brings me onto my next part, which is about how robots learn. So we’re getting closer to robots being able to act in very human ways, but we haven’t actually made that much progress in terms of real thinking or consciousness. And that’s largely due to limitations in how robots learn. Basically, AI is based on a special class of algorithms called ‘deep learning’. What this means is that AI is trained by giving it very large amounts of pre-structured data. And the basis for this learning method is really quite old- it comes from brain research from the middle of the last century. The advances of recent years have been made possible by improved hardware and better access to huge amounts of training data, but we’re now held back by the archaic learning method.

So then, how can progress be made in the way AI learns? Well, according to industry expert professor Helmut Linde, there needs to be significant input from modern neuroscience about how the brain learns. And to some extent progress is being made. There’s now a field called ‘robopsychology’, which is the study of personality and behavior in intelligent machines. Interesting right? Well, the term robopsychology was first used in the 1950s by science fiction writer Isaac Asimov, but it’s now a real thing. And there’s been some development, for example with an experimental project at Florida University to create AI that can learn language naturally, like you are now, without programmed language rules. So if a conscious AI is desirable, and I know that’s a big ‘if’, then we’re moving in the right direction. But the fact of the matter is, there’s still a long way to go. Because what we really need to move on from deep learning is a complete theory from the field of mathematics. In the same way that "probability theory” has been the basis for modern statistics, we need a "theory of intelligence" with which we can develop new learning algorithms.

And that brings me on to last part of my lecture today, which is changing public perceptions of AI. In the past, public imagination was fueled by popular movies depicting robots taking over the world. There was very little in reality on which people could base their opinions. Now, however, we can see AI in some sort of real sense. And this has moved the debate forward. On the positive side, human life has improved because of AI. Take the field of medicine for example: medical robots can perform highly accurate surgery and target medicines to where they’re needed inside the body. And this helps to paint a more optimistic view of AI. On the other hand, there are still concerns, but according to a 2021 study, these concerns are much more based on real developments such as job losses and privacy issues than ‘interesting’ concepts from popular culture.

So that’s all for today. I hope you can see how every aspect of AI is changing. Classic definitions such as strong and weak AI are not as clear as they once were. We are still limited by the way AI learns, but there is also evidence that this area is developing. And as the technology changes so do the perceptions that people have of it. Perhaps the current zeitgeist is best summed up by Elon Musk, who describes it as one of ‘cautious optimism’. Thanks for listening.

大家早上好。我想知道当你听到 "人工智能 "这个词时，你的直接反应是什么？困惑？兴奋？不信任......或者也许是方便？嗯，根据最近的研究，公众对人工智能的看法正在改变。这其实并不奇怪，因为社会已经迅速从人工智能的概念时代--科幻电影和穿白大褂的疯狂科学家的领域--发展到现在，它已经成为现实。那么今天，我将会看一下人工智能的现状。首先，我将看一下技术发展，然后我将考虑人工智能学习方式的局限性以及如何克服这些局限性。最后，我将简要地探讨公众对人工智能的意见变化。

好的，那么首先让我们看一下已经发生的技术变化。好吧，当试图理解人工智能时，我们通常将其分为弱和强。弱人工智能是我们日常所见的--无意识的系统，有特定的功能--比如说操作你的洗衣机或地板清洁机器人。另一方面，强人工智能......那是想象力发挥作用的地方--那是关于具有人类特征的机器人--它们复制并有可能取代人类......我相信你们都看过机器人接管世界的电影。

所以强者和弱者......这就是经典的划分。但根据目前的文献，我们已经到了一个界限不那么清晰的地步--事实上，它现在更像是一个连续体。人工智能分析师凯瑟琳-沃尔奇（Kathleen Walch）最近的一篇文章解释说，人工智能研究已经在各个领域取得了令人印象深刻的进展--例如，在图像和语音的处理、机器的运动控制以及下棋等游戏方面。尽管我们仍有一些距离，但这正使我们接近强大的人工智能形式。为了进一步说明这一点，让我给你一个更详细的例子。

我们可以说，情感是人类的独特特征，至少它们是人工智能所不具备的特征，对吗？好吧，让我们想一想人类是如何对情绪做出反应的。我们所做的是处理我们已经归类的图像。如果我们看到一张快乐、悲伤、愤怒、惊讶的脸，我们知道这意味着什么，因为我们之前已经看过无数次。然后呢？好吧，我们做出相应的反应：我们提供同情或祝贺，使用过去的经验来判断我们的反应。现在，机器人也能做到这一切。根据行业专家Vidushi Meel的说法，图像识别的进步意味着通过分析数以千计的图片，机器人可以准确理解人类的感受，并可以被教导以大量不同的方式作出反应。所以我问你......这是人类吗？......嗯，它肯定是在弱-强人工智能连续体的某个地方，对吗？但与此同时，我们可以说它绝对不是人类，因为它缺乏真正的感觉或意识。你同意吗？

好吧，这个例子把我带到了下一个部分，也就是关于机器人如何学习。因此，我们越来越接近机器人能够以非常人性化的方式行事，但在真正的思考或意识方面，我们实际上还没有取得太大的进展。而这主要是由于机器人学习方式的限制。基本上，人工智能是基于一类特殊的算法，称为 "深度学习"。这意味着，人工智能是通过给它提供非常大量的预先结构化的数据来训练的。这种学习方法的基础真的很古老--它来自上世纪中期的大脑研究。近年来的进步是通过改进硬件和更好地获得大量的训练数据而实现的，但我们现在被古老的学习方法所阻碍。

那么，如何才能在人工智能的学习方式上取得进展？嗯，根据行业专家赫尔穆特-林德（Helmut Linde）教授的说法，需要从现代神经科学中获得关于大脑如何学习的重要信息。而且在某种程度上正在取得进展。现在有一个叫做 "机器人心理学 "的领域，它是对智能机器的个性和行为的研究。有意思吧？嗯，机器人心理学这个词是在20世纪50年代由科幻作家艾萨克-阿西莫夫首次使用，但它现在是一个真实的东西。而且已经有了一些发展，例如佛罗里达大学的一个实验项目，创造出可以自然学习语言的人工智能，就像你现在这样，没有编程的语言规则。因此，如果有意识的人工智能是可取的，我知道这是一个很大的 "如果"，那么我们正在朝着正确的方向前进。但事实是，还有很长的路要走。因为我们真正需要从深度学习中前进的是来自数学领域的完整理论。就像 "概率论 "是现代统计学的基础一样，我们需要一个 "智能理论"，我们可以用它来开发新的学习算法。

这让我想到了我今天演讲的最后一部分，即改变公众对人工智能的看法。在过去，公众的想象力被描述机器人占领世界的流行电影所激发。在现实中，人们几乎没有什么可以作为他们意见的基础。然而现在，我们可以在某种真正意义上看到人工智能。而这也推动了辩论的发展。在积极的一面，人类生活因为人工智能而得到了改善。以医学领域为例：医疗机器人可以进行高度精确的手术，并将药物定向到身体内部需要的地方。而这有助于为人工智能描绘一个更乐观的前景。另一方面，仍然存在担忧，但根据2021年的一项研究，这些担忧更多的是基于真实的发展，如失业和隐私问题，而不是来自流行文化的 "有趣 "概念。

所以今天就到此为止。我希望你能看到人工智能的每个方面都在变化。经典的定义，如强人工智能和弱人工智能，已经不像以前那样清晰。我们仍然受到人工智能学习方式的限制，但也有证据表明这一领域正在发展。随着技术的变化，人们对它的看法也在变化。也许埃隆-马斯克对当前的时代潮流做了最好的总结，他将其描述为 "谨慎的乐观主义"。感谢您的收听。