Intro duction to ai

Week 2 machine learining:

The rise of AI has been largely driven by

one tool in AI called machine learning.

In this video, you'll learn what

is machine learning, so that by the end,

you hope we will start thinking how machine learning

might be applied to your company or to your industry.

The most commonly used type

of machine learning is a type of AI

that learns A to B,

or input to output mappings.

This is called supervised learning.

Let's see some examples.

If the input A is an email and

the output B one is email spam or not, zero one.

Then this is the core piece of AI

used to build a spam filter.

Or if the input is an audio clip,

and the AI's job is to output the text transcript,

then this is speech recognition.

More examples, if you want to

input English and have it output a different language,

Chinese, Spanish, something else,

then this is machine translation.

Or the most lucrative form of supervised learning,

of this type of machine learning

maybe be online advertising,

where all the large online ad platforms have

a piece of AI that inputs some information about an ad,

and some information about you,

and tries to figure out,

will you click on this ad or not?

By showing you the ads you're most likely to click on,

this turns out to be very lucrative.

Maybe not the most inspiring application,

but certainly having a huge economic impact today.

Or if you want to build a self-driving car,

one of the key pieces of AI

is in the AI that takes as input an image,

and some information from

their radar, or from other sensors,

and output the position of other cars,

so your self-driving car can avoid the other cars.

Or in manufacturing.

I've actually done a lot of work in

manufacturing where you take

as input a picture of something you've just manufactured,

such as a picture of

a cell phone coming off the assembly line.

This is a picture of a phone,

not a picture taken by a phone,

and you want to output,

is there a scratch, or is there a dent,

or some other defects on

this thing you've just manufactured?

And this is visual inspection which is helping

manufacturers to reduce or

prevent defects in the things that they're making.

This set of AI called supervised learning,

just learns input to output,

or A to B mappings.

On one hand, input to output,

A to B it seems quite limiting.

But when you find a right application scenario,

this can be incredibly valuable.

Now, the idea of supervised learning

has been around for many decades.

But it's really taken off in

the last few years. Why is this?

Well, my friends asked me, "Hey Andrew,

why is supervised learning taking off now?"

There's a picture I draw for them.

I want to show you this picture now,

and you may be able to draw this picture for

others that ask you the same question as well.

Let's say on the horizontal axis you

plot the amount of data you have for a task.

So, for speech recognition,

this might be the amount of

audio data and transcripts you have.

In lot of industries,

the amount of data you have access to

has really grown over the last couple of decades.

Thanks to the rise of the Internet,

the rise of computers.

A lot of what used to be say pieces of paper,

are now instead recorded on a digital computer.

So, we've just been getting more and more data.

Now, let's say on the vertical axis you plot

the performance of an AI system.

It turns out that if you use a traditional AI system,

then the performance would grow like this,

that as you feed in more data

is performance gets a bit better.

But beyond a certain point it

did not get that much better.

So it's as if your speech recognition system

did not get that much more accurate,

or your online advertising system didn't get that

much more accurate that's showing the most relevant ads,

even as you show the more data.

AI has really taken off recently due to

the rise of neural networks and deep learning.

I'll define these terms more precise in later video,

so don't worry too much about what it means for now.

But with modern AI,

with neural networks and deep learning,

what we saw was that,

if you train a small neural network,

then the performance looks like this,

where as you feed them more data,

performance keeps getting better for much longer.

If you train a even slightly larger neural network,

say medium-sized neural net,

then the performance may look like that.

If you train a very large neural network,

then the performance just

keeps on getting better and better.

For applications like speech recognition,

online advertising, building self-driving car,

where having a high-performance,

highly accurate, say

speech recognition system is important,

enable these AI systems get much better,

and make speech recognition products

much more acceptable to users,

much more valuable to companies and to users.

Now, a few couple of implications of this figure.

If you want the best possible levels of performance,

your performance to be up here,

to hit this level of performance,

then you need two things: One is,

it really helps to have a lot of data.

So that's why sometimes you hear about big data.

Having more data almost always helps.

The second thing is, you want to be able

to train a very large neural network.

So, the rise of fast computers, including Moore's law,

but also the rise of

specialized processors such as

graphics processing units or GPUs,

which you'll hear more about in a later video,

has enabled many companies,

not just a giant tech companies,

but many many other companies to

be able to train large neural nets on

a large enough amount of data in order to get

very good performance and drive business value.

The most important idea in AI has been machine learning,

has basically supervised learning,

which means A to B,

or input to output mappings.

What enables it to work really well is data.

In the next video,

let's take a look at what is

the data and what data you might already have?

And how to think about feeding this into AI systems.

Let's go on to the next video.