IBM AI course (MOD 4)

How does machine learning approach a problem?

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If AI doesn't rely on programming instructions to work with unstructured data, how does AI do it? Machine learning can analyze dark data far more quickly than a programmable computer can. To see why, consider the problem of finding a route through big city traffic using a navigation system. It's a dark data problem because solving it requires working with not only a complicated street map, but also with changing variables like weather, traffic jams, and accidents. Let's look at how two different systems might try to solve this problem.

SOLUTION

PROGRAMMABLE COMPUTER	AI WITH MACHINE LEARNING
Researchers upload a massive database of all potential city routes (structured data).	• Machine learning AI approaches the city navigation problem like climbing a tree.
They continuously update this database with real-time weather and traffic information.	It starts at the "base" with a route and then, at branches, it forks in different directions

A programmable computer is used to search through this data for a route from start to finish.	This process continues until it either reaches the destination or a dead end.
• This approach demands significant resources and time, and success might be uncertain due to the immense complexity of the task.	The AI repeats this process multiple times, comparing successful routes to find the shortest one.
	While it may seem repetitive, this approach uses fewer resources and is faster compared to the traditional method.

The machine learning process is entirely different

The machine learning process has advantages:

- It doesn't need a database of all the possible routes from one place to another. It just needs to know where places are on the map.

- It can respond to traffic problems quickly because it doesn't need to store alternative routes for every possible traffic situation. It notes where slowdowns are and finds a way around them through trial and error.

- It can work very quickly. While trying single turns one at a time, it can work through millions of tiny calculations.

But machine learning has two more advantages that programmable computers lack:

- **Machine learning can predict.** You know this already. A machine can determine, "Based on traffic right now, this route is likely to be faster than that one." It knows this because it compared routes as it built them.

- **Machine learning learns!** It can notice that your car was delayed by a temporary detour and adjust its recommendations to help other drivers.

Machine learning uses probabilistic calculation

- Deterministic systems rely on predetermined structures, like databases of routes, providing binary answers (YES/NO).

- Machine learning is probabilistic, offering confidence values instead of binary decisions.

- Machine learning considers all variables, including real-time factors like changing traffic.

- It doesn't declare "the fastest route" but rather expresses confidence in a route's effectiveness.

- The final decision when using machine learning can be critical, especially in situations like medical treatment choices.

Reflection:

- When faced with a serious medical condition, the decision between a doctor's prescription and a machine learning-based treatment recommendation raises significant considerations.

- The choice may depend on trust in the technology, the doctor's expertise, and individual comfort with the level of human or AI involvement in the decision-making process.

DOES COMMON SENSE MAKE SENSE?

- Common sense is a vital but elusive capability.

- It draws from complex generalizations, compassion, and abstractions.

- Humans are currently the best at using common sense.

- However, human common sense can be influenced by biases.

- AI systems, when trained with unbiased data, can provide unbiased recommendations.

- A partnership between humans and machines can lead to more sensible decisions, combining the strengths of both.

In summary, common sense is important, but it can be biased when solely relying on humans. AI systems, with unbiased data, can complement human judgment to make more rational decisions in various fields.