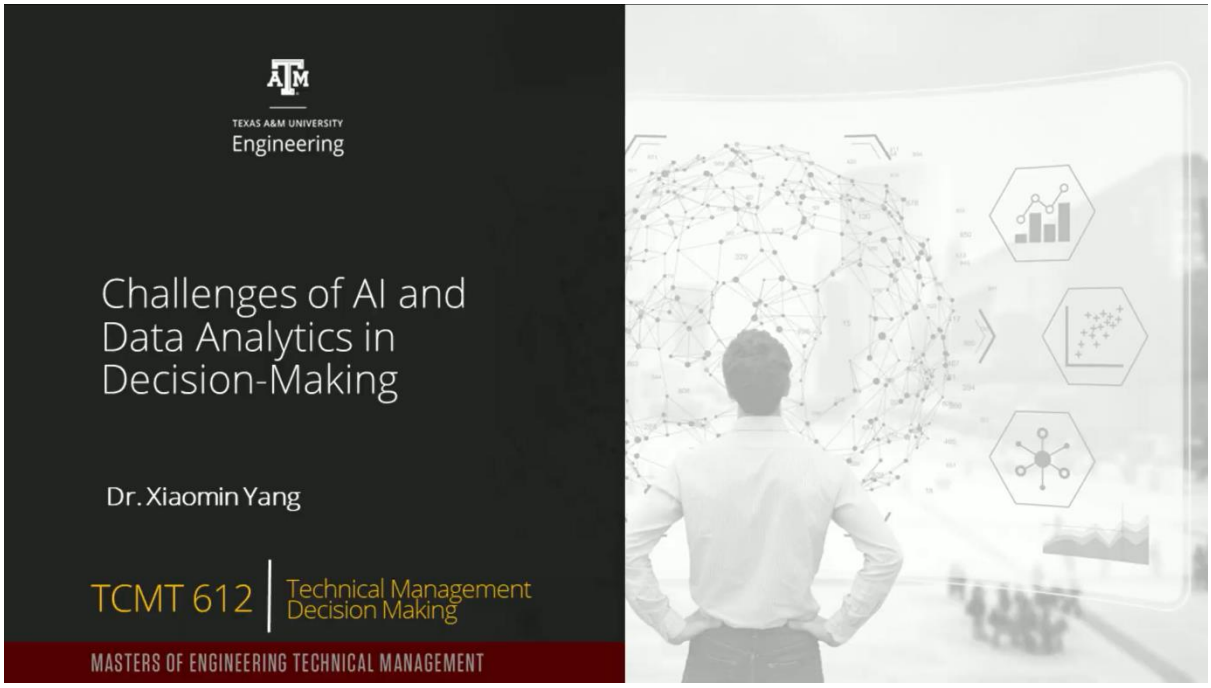
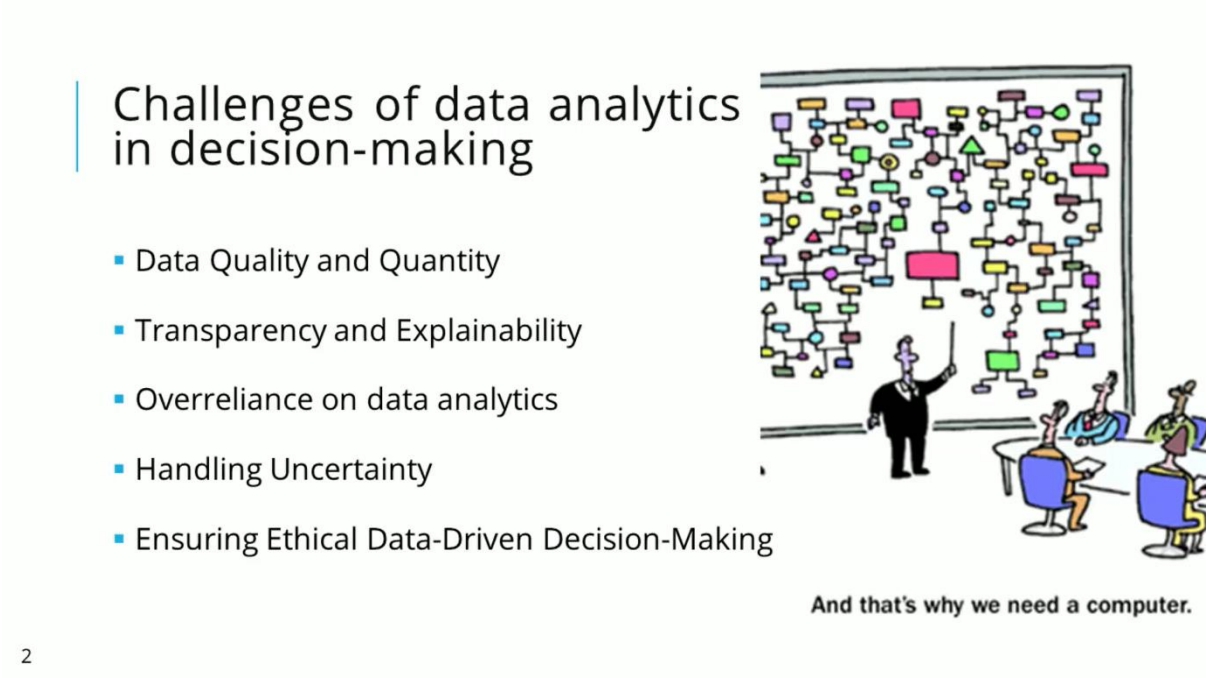
M1L4. Challenges of Data Analytics and AI in Decision-Making

Slide #1



Slide #2



The integration of data analytics tools into the decision-making process is reshaping the field of data science. Yet it is crucial for practitioners to be aware of the challenges associated with this transformative technology. Here are the top high impact challenges of data analytics in decision making in their real-world applications.

Slide #3

The quality and quantity of data play a big role in how well data-driven systems perform.

Good data should be accurate, complete, and reliable, and there should be enough of it for developing data analytics models.

It's like the saying garbage in, garbage out. If the data used to teach data analytics is flawed, the results won't be reliable.Biased or incomplete data can make analytics models give wrong predictions, reinforcing existing biases. And if the data is outdated, the analytical decision-making system might struggle to adapt to changes in the environment.

Slide #4

For example, a global manufacturing company developed a smart system to predict when machines need maintenance.

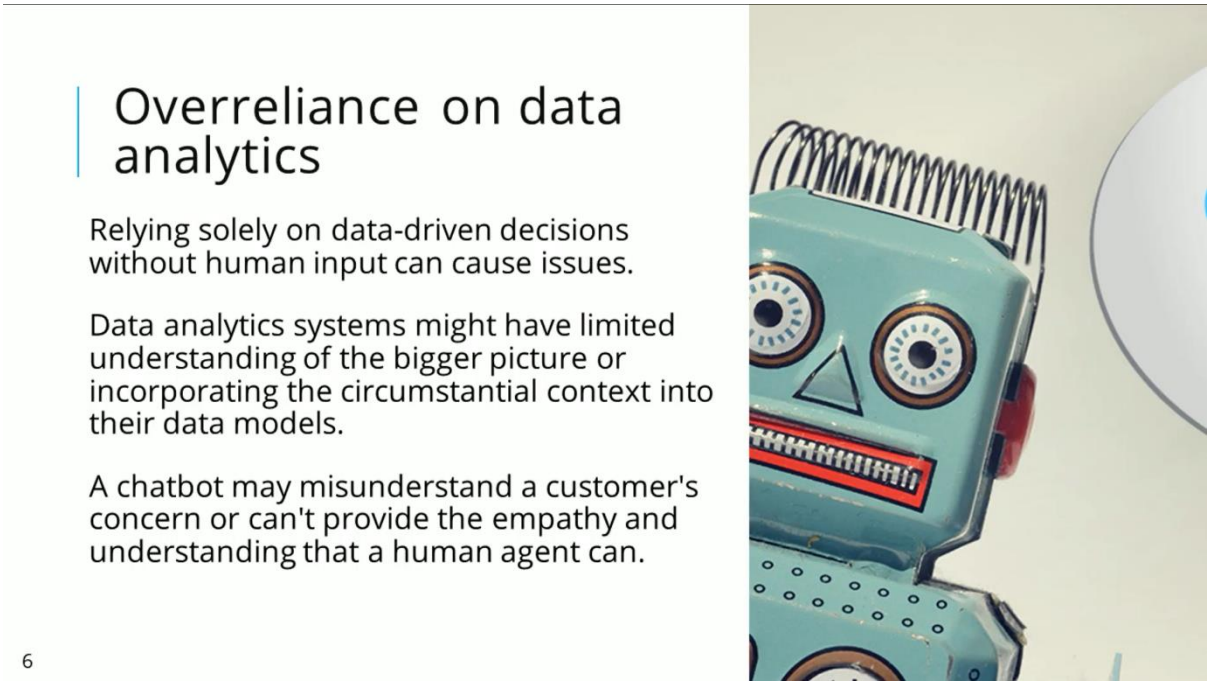
This system relies on data from sensors on newer machines, but older machines don't have these sensors. They use manual readings, which might not be complete or accurate. This mix of data can make the system have trouble predicting machine issues. So, having good and enough data is important. It helps the system work better, reducing downtime and making the whole manufacturing process smoother.

Slide #5

In today's world, where analytical decision-making systems are getting more sophisticated, it's vital for people to understand how these systems make decisions. Making analytics models transparent and easy to explain. is important for building trust and being accountable to users. This means finding ways to make the decision-making process of data driven systems clear and understandable, especially in areas like healthcare and finance, where decisions can have significant impacts on people's lives.

For instance, a hospital uses data analytics to help doctors decide on the best treatment for patients. If the system is not transparent and doctors can't understand why it recommends a certain treatment, it might be challenging for them to trust and use the technology. By making the algorithm generated decisions more transparent and easier to explain, doctors can feel more confident in the recommendations, fostering trust in the technology and potentially improving patient outcome.

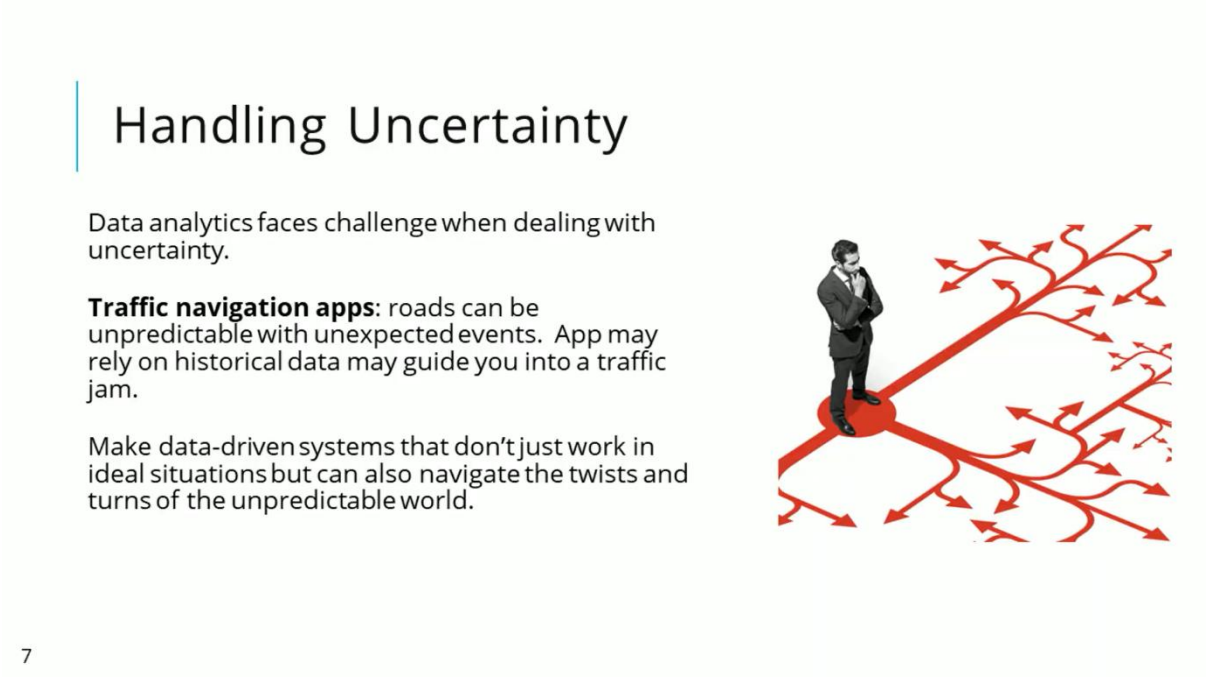
Slide #6



Relying too much on data-driven decisions without considering human input can cause issues because data analytic systems might not be capable of understanding the bigger picture or incorporating the circumstantial context into their data models. It's like letting a computer pick a restaurant without knowing your preferences. The choice might not be what you really want. So, finding the right balance between letting data analytics help and using human judgment is important to avoid potential problems. A good example of this is in customer service. If companies solely rely on natural language processing chatbots to assist customers, there might be situations where the chatbot misunderstands a customer's concern or can't provide the empathy and understanding that a human agent can.

Striking a balance between computers handling routine queries and humans handling more complex or emotionally nuanced interactions ensures a better overall customer experience. It's about finding ways for data analytics and humans to work together effectively, recognizing the strengths of each and creating systems that allow them to collaborate seamlessly.

Slide #7

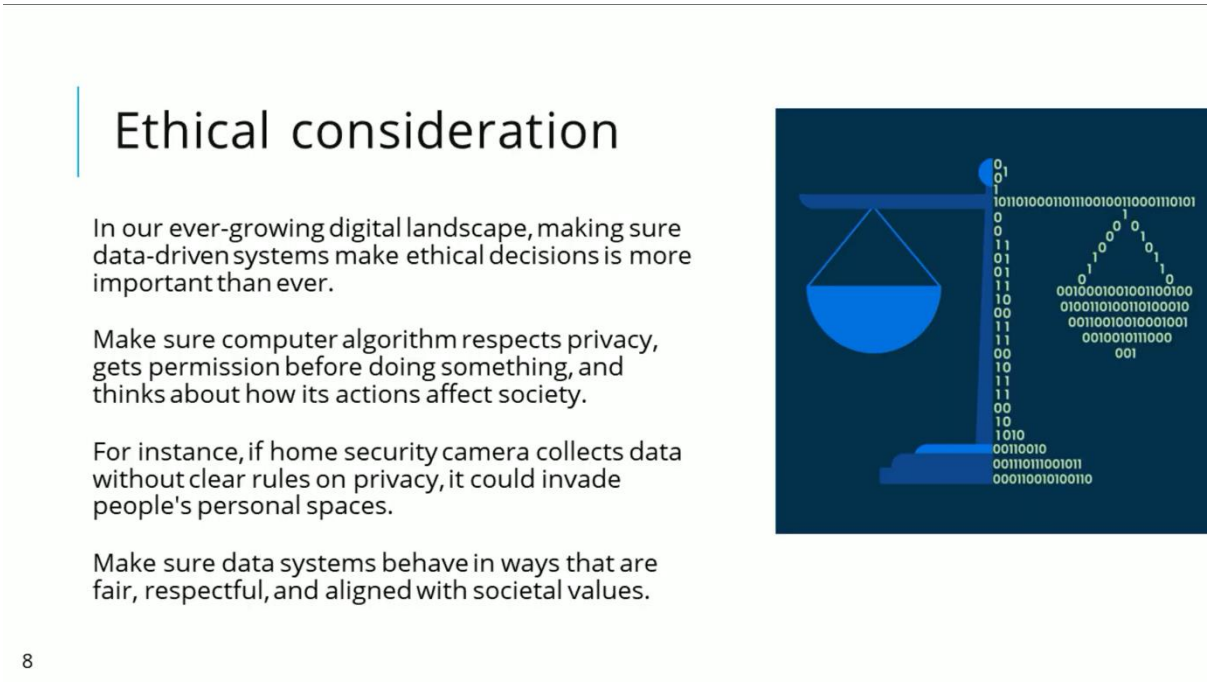


In the real world, data analytics faces a tough challenge when dealing with uncertainty and ever-changing situations. Imagine if your weather app only predicted sunny days, but you end up getting caught in the rain. That's like analytics struggling in uncertain environments. Data models need to handle unexpected events and changes, which is a big challenge.

We all use traffic navigation apps and experience their real time traffic features. In a city, roads can be unpredictable with unexpected events like accidents or sudden construction. If the app relies on historical data and doesn't adapt well to real time changes, it might guide you into a traffic jam.

Developing data analytics systems that can handle this uncertainty by incorporating real time information and adjusting recommendations on the go ensures that the app gives reliable guidance, even amid unforeseen events. It's about making data driven systems that don't just work in ideal situations but can also navigate the twists and turns of the unpredictable real world.

Slide #8



In our ever-growing digital landscape, making sure data driven systems make ethical decisions is more important than ever. Think about a voice assistant that might record private conversations without consent. That could be a big problem. So, it's crucial to create clear rules and guidelines for data systems, particularly AI, kind of like having a set of ethical guidelines for technology to follow.

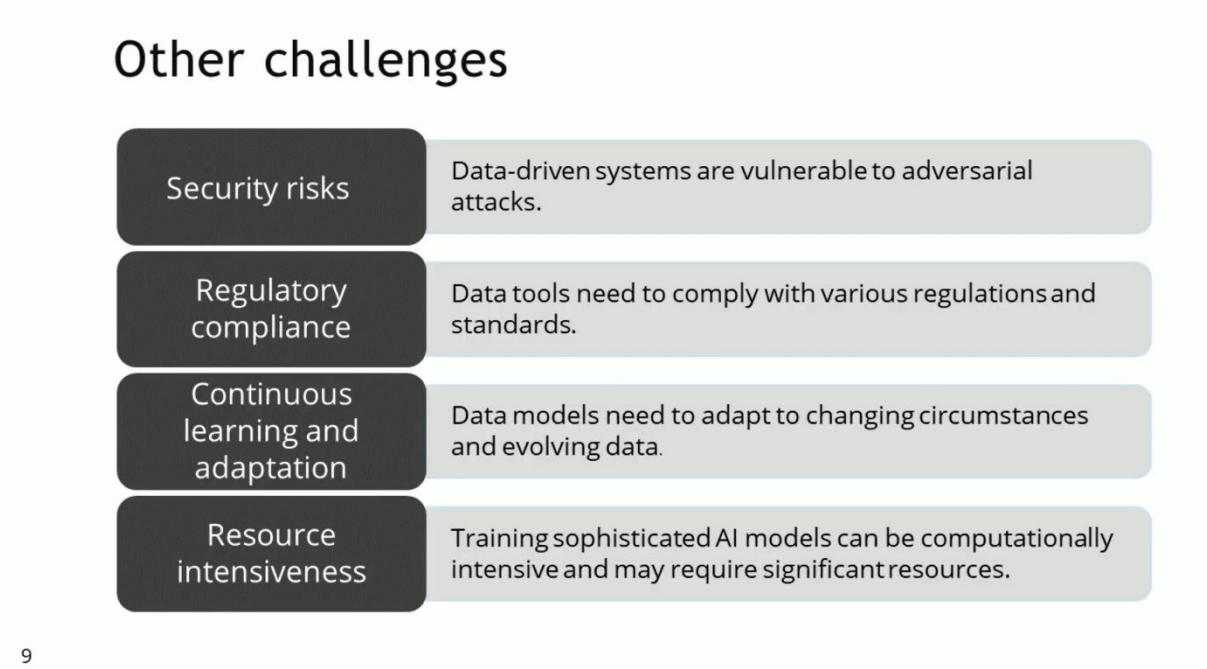
This includes making sure that the computer algorithm respects privacy, gets permission before doing something, and thinks about how its actions affect society.

One sensitive example is smart home devices. If a computer vision powered device, like a home security camera, collects data without clear rules on privacy, it could invade people's personal spaces.

Ensuring ethical analytics decision-making means setting up guidelines to make sure these devices respect people's privacy, only record when necessary, and obtain permission before sharing any data. Creating frameworks for ethical data driven systems helps in responsibly deploying technology, ensuring it benefits individuals and society without compromising fundamental values or privacy rights.

It's about making sure data systems are not just smart, but also behave in ways that are fair, respectful, and aligned with societal values.

Slide #9


Other challenges
Security risks
Data-driven systems are vulnerable to adversarial attacks.
Regulatory compliance
Data tools need to comply with various regulations and standards.
Continuous learning and adaptation
Data models need to adapt to changing circumstances and evolving data.
Resource intensiveness
Training sophisticated AI models can be computationally intensive and may require significant resources.
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Security risks. Data driven systems are vulnerable to adversarial attacks, where malicious actors deliberately manipulate input data to deceive the system or force it to make incorrect decisions.

Regulatory compliance. Data tools, particularly AI systems, need to comply with various regulations and standards, especially in sensitive domains such as healthcare and finance.

Continuous learning and adaptation. Data models need to adapt to changing circumstances and evolving data.

Resource intensiveness. Training sophisticated AI models can be computationally intensive and may require significant resources. Deploying resource intensive models in real world scenarios can be challenging, especially in resource constrained environments.