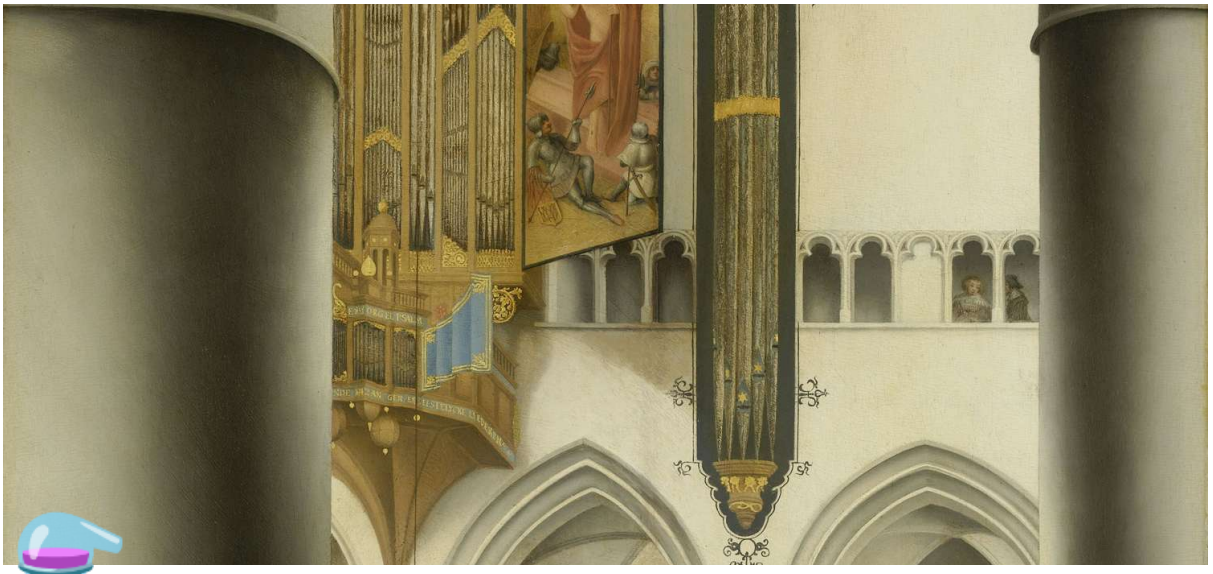

IBM ML/DL MOD1

How do machines learn?

> AI systems use **algorithms** to predict and classify data points collected both from computer databases and natural occurrences. But algorithms have three general ways that they can **learn** from this data to get better results and provide better predictions:
>
> - Supervised learning
> - Unsupervised learning
> - Reinforcement learning

SUPERVISED LEARNING

Certainly, here's a shorter summary in bullet points:

- **Supervised Learning**: AI systems are trained using structured data with labeled examples.
- **Pattern Detection**: They learn patterns and correlations between inputs and labels.
- **Predictive Modeling**: This enables them to make predictions on new data.
- **Confidence Values**: AI systems provide confidence scores for their predictions.
- **Accuracy Improves with Data**: More data improves prediction accuracy.
- **Image Recognition**: Supervised learning can be used for image classification.
- **Classification with Confidence**: It assigns confidence levels to class predictions.
- **Widespread Application**: Used in various fields like image recognition and natural language processing.

UNSUPERVISED LEARNING

In contrast to supervised learning, **unsupervised learning** trains a machine with **unlabeled** data, such as the text of a book. Training an AI system with unlabeled data is more difficult because the system can't make predictions until it has structured the data itself. In the book example, structuring the data would involve breaking down the text and finding relationships between words and sentences. So, algorithms explore the data and try to find structure.

For example, a system might be fed many articles about different kinds of plants and form its own conclusions of their attributes. When the system ingests new text describing a plant, it identifies it and gives it a confidence value.

REINFORCEMENT LEARNING

- **Trial and Error Learning**: In reinforcement learning, machines learn by trial and error.
- **Rewards and Penalties**: Algorithms are rewarded for correct actions and penalized for incorrect ones.
- **Confidence-Based Answers**: Machines provide answers with a confidence value between 100% correct and 100% incorrect.

- **Continuous Improvement**: Through repeated penalties and rewards, the machine's answers become more accurate.
- **Long-term Goals**: It's useful for tasks where machines make sequential decisions to achieve long-term goals, such as game-playing.