Data Schools

Machine Learning
2. New Developments

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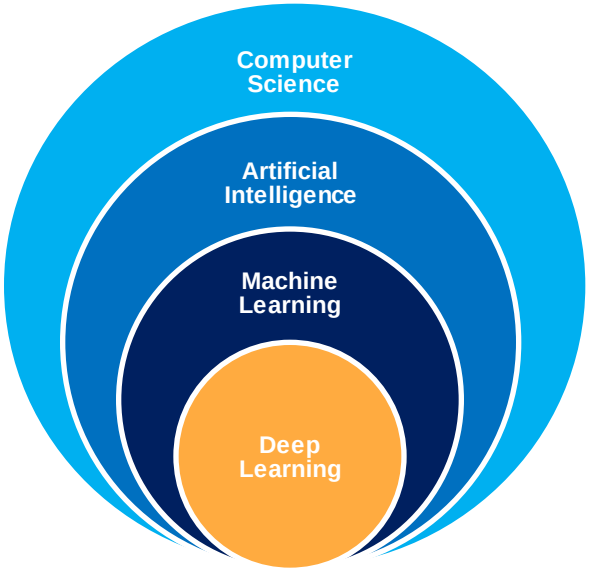
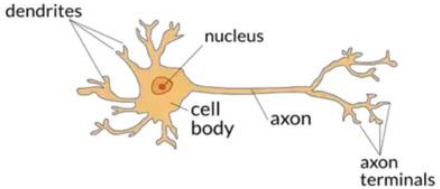
Exciting New Topics

1. Deep Learning
2. Knowledge Graph
3. AI/ML on Big Data Platforms
4. Innovations in Recommender Systems

The Evolving World of Deep Learning

Deep learning is a class of machine learning algorithms that use neural networks. They are designed to model the responses of neurons in the human brain.





MIT Open courseware (OCW) links
https://ocw.mit.edu/courses/sloan-school-of-management/15-097-prediction-machine-learning-and-statistics-spring-2012/

From Languages to Information
http://web.stanford.edu/class/cs124/

Natural Language Processing with Deep Learning
http://web.stanford.edu/class/cs224n/

Tensorflow for Deep Learning Research
http://web.stanford.edu/class/cs20si/

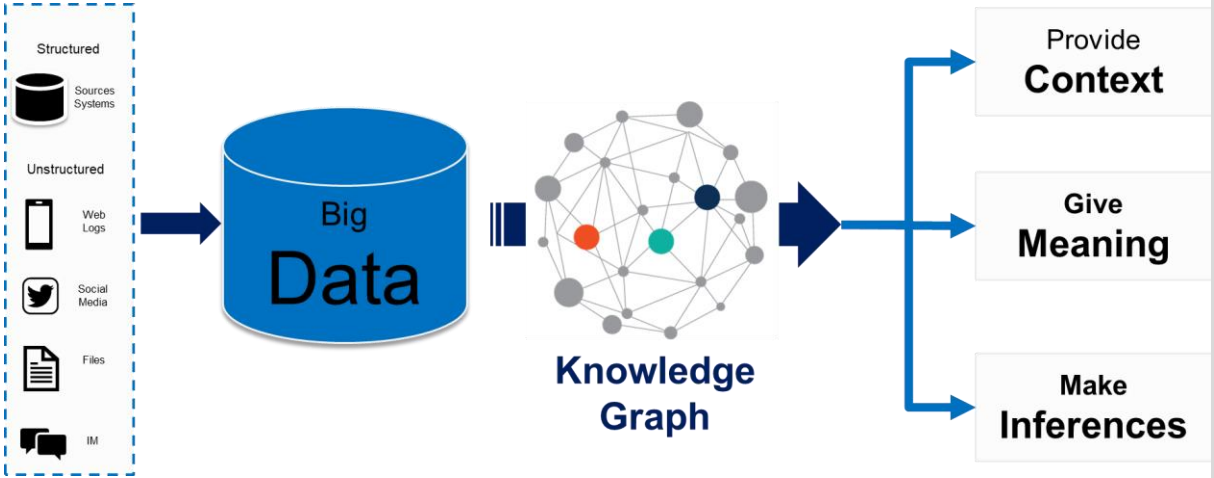
Convolutional Neural Networks for Visual Recognition
http://cs231n.stanford.edu/

Machine Learning
http://web.eecs.umich.edu/~cscott/past_courses/eecs545f15/index.html

Artificial Intelligence
http://www.cs.cornell.edu/courses/cs472/2007fa/

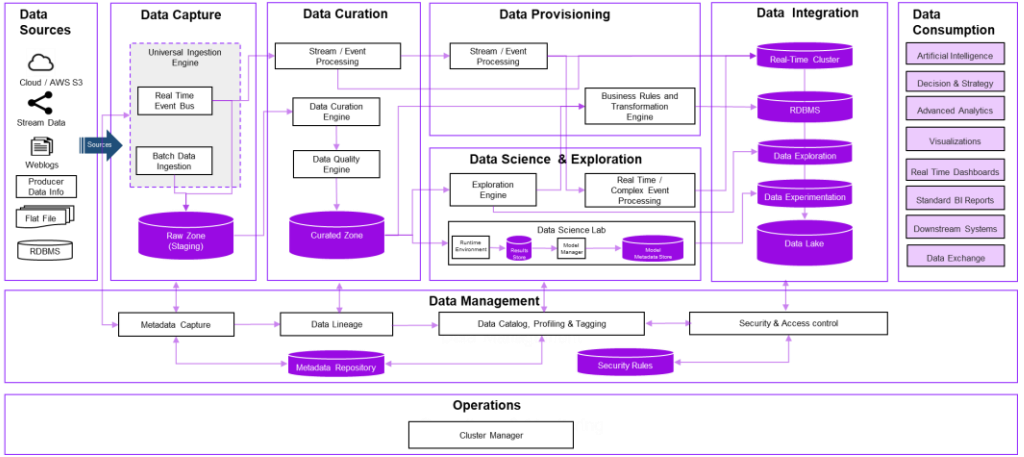
Knowledge Graphs – Why You Need Em

- Knowledge graphs give AI applications intelligence – Semantic AI



- Enterprise knowledge graphs provide context behind your AI statistical algorithms to achieve the sought-after cognitive applications.
- Enterprise knowledge graphs help your AI discover hidden facts and relationships through inferences in your integrated content that you would otherwise be unable to catch on a large scale.
- Enterprise knowledge graphs help you identify all information you have in disparate data sources throughout your organization on a specific topic, about a specific person, project, product, claim, etc

AI / ML In The Era Of Big Data



AI technologies and applications leveraging machine learning and acting on big data

A modern data architecture

A modern data platform facilitates the storage and processing of big data through an intelligent data pipeline supporting advanced analytics, data science exploration and AI/ML

Machine Learning in the Lab	Machine Learning in the Production
• Ad-hoc, post-hoc	• Systematic
• Question-driven	• Outcome-driven
• Interactive	• Automated
• Fixed data	• Fluid data
• Focus on speed and flexibility	• Focus on transparency and reliability
• Output is embedded into a report or in-database scoring	• Output is a production system that makes customer-facing decisions

Innovations in Recommender Systems

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Neural Networks

- Neural network embeddings are a method of mapping from discrete objects, such as words to vectors of continuous values.
- They are useful for finding similarities, visualization purposes and as an input into another machine learning model.

Deep Learning

- The most common deep learning network for this type of processing is the Multilayer Perceptron (MLP). It invokes a prediction function that is composed of layering a sequence of fully connected layers and an activation function to capture the most complex interactions of data at hand.

Big Data

- Big Data techniques such as association rule mining are inserted in three steps:
  1. Feature Extraction to generate the customer's product rating matrix,
  2. Low Dimension Latent Factor Matrix that uses the alternating least square method and
  3. Association Rule Mining Algorithm for generating multistage rule recommendations.

Knowledge Graph

- One approach by applying KG into RS is using the KGE (Knowledge Graph Embedding).
- By replacing the FastText embedding, or using KGE as additional feature vectors, we could improve the performance of recommendation..

Summary and next topics

1. You implemented a recommender engine using collaborative filtering approach in R
2. There are emerging technologies and methods shaping the world of Machine Learning, including Deep Learning, Neural Networks, Knowledge Graphs and Big Data
3. These has also added new approaches to recommender system
4. Tips on how you can teach this course

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