IT4931
Tích hợp và xử lý dữ liệu lớn

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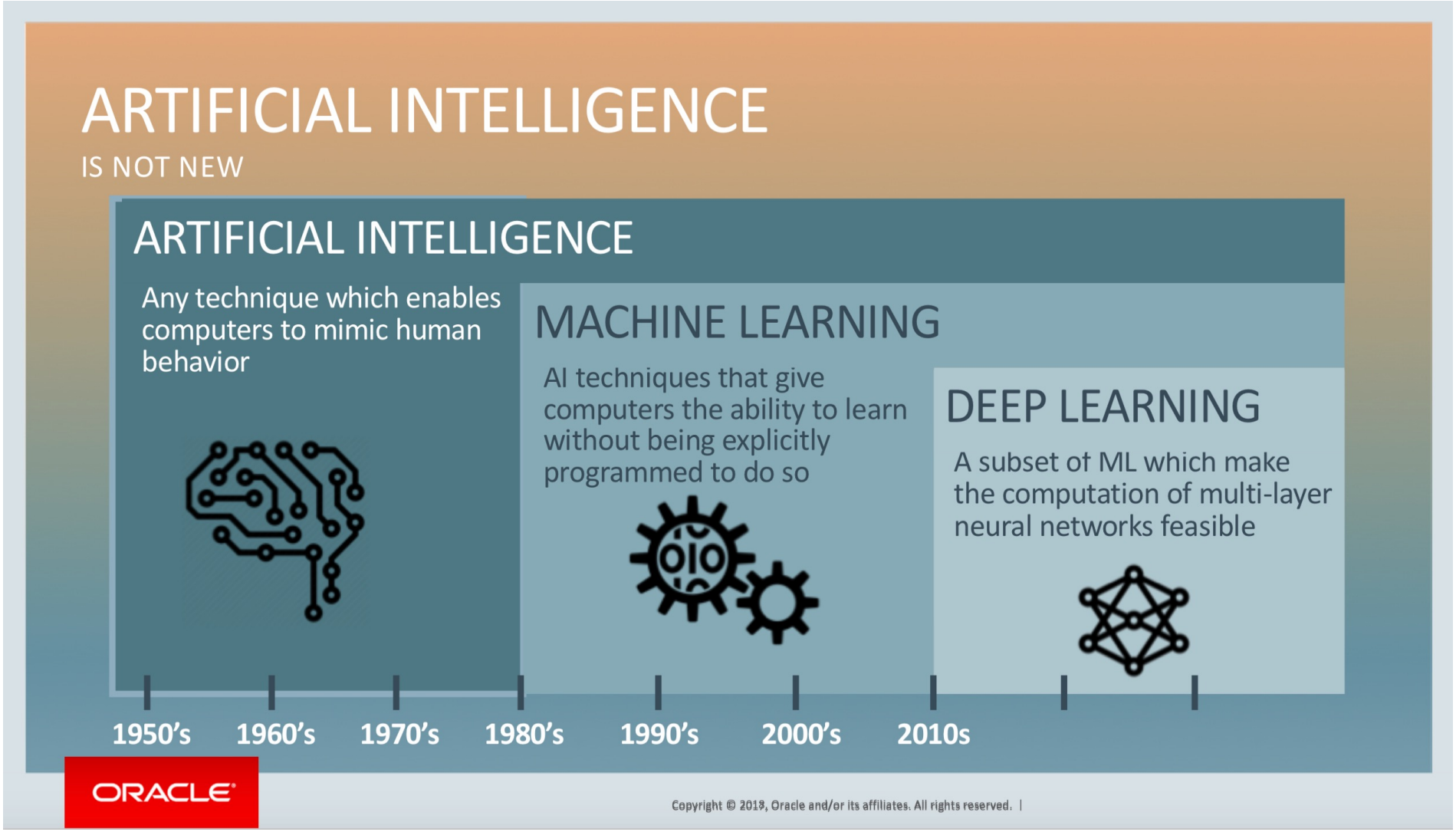
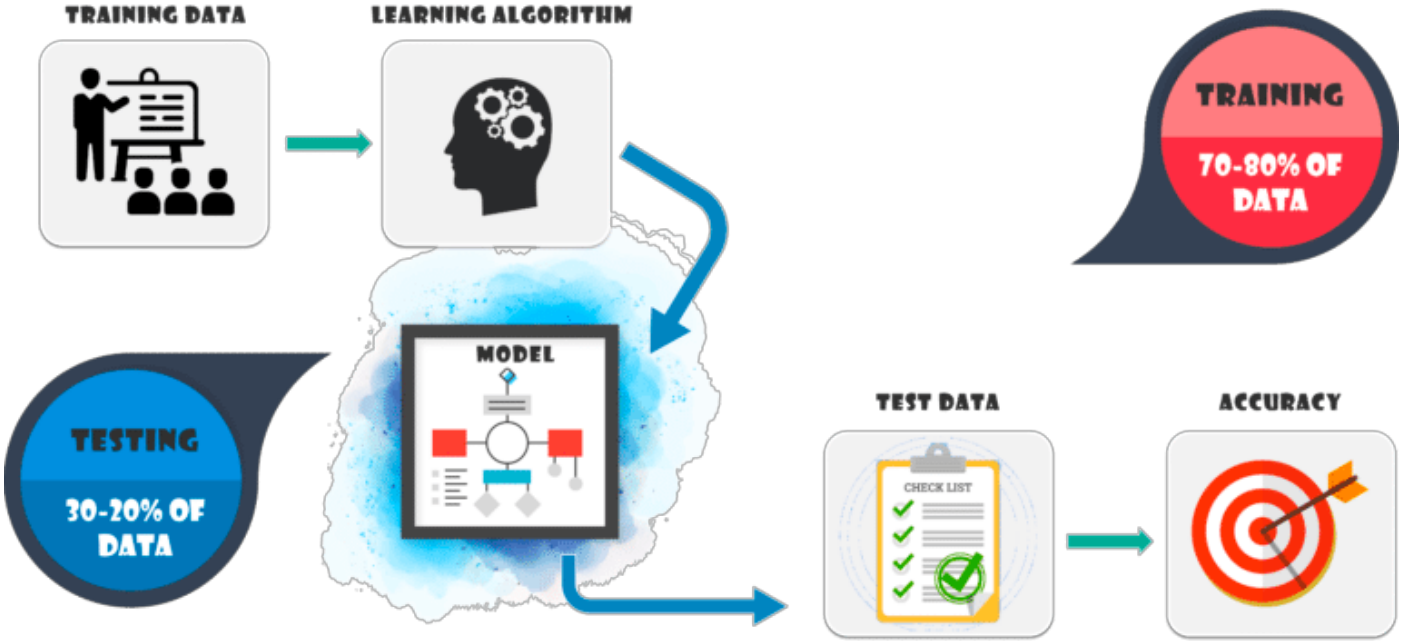
Machine learning



From [1]

Machine Learning Lifecycle

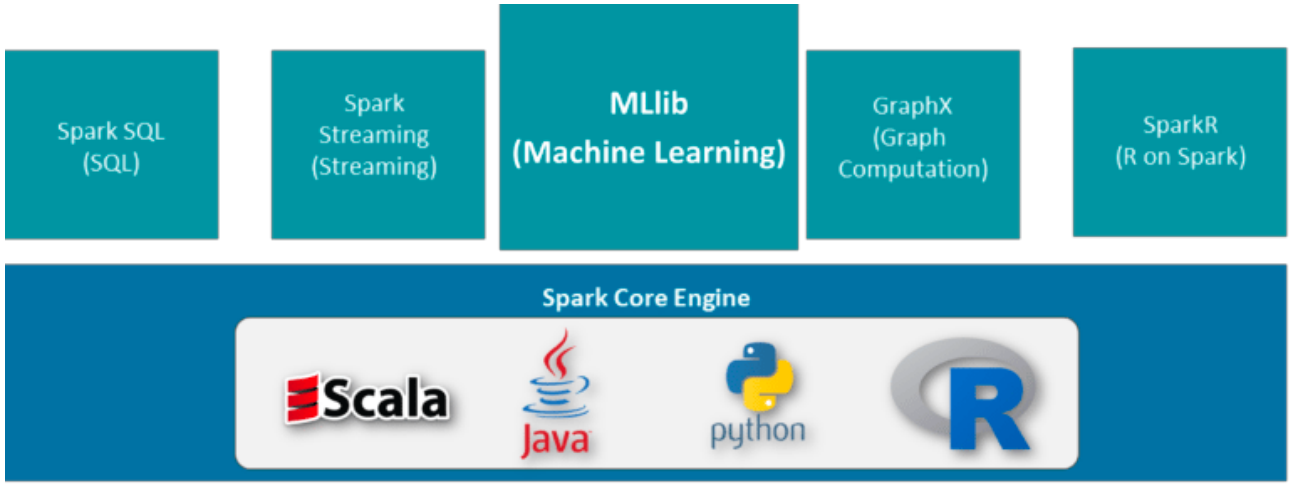
- Two major phases
  - **Training Set**
    - You have the complete training dataset
    - You can extract features and train to fit a model.
  - **Testing Set**
    - Once the model is obtained, you can predict using the model obtained on the training set



From [2]

Spark ML and PySpark

- Spark ML is a machine-learning library
  - Classification: logistic regression, naive Bayes
  - Regression: generalized linear regression, survival regression
  - Decision trees, random forests, and gradient-boosted trees
  - Recommendation: alternating least squares (ALS)
  - Clustering: K-means, Gaussian mixtures (GMMs)
  - Topic modeling: latent Dirichlet allocation (LDA)
  - Frequent item sets, association rules, and sequential pattern mining
- PySpark is an interface for using Python



From [2]

Binary Classification Example [3]

- **Binary Classification** is the task of predicting a binary label
  - Is an email spam or not spam?
  - Should I show this ad to this user or not?
  - Will it rain tomorrow or not?
- The Adult dataset
  - https://archive.ics.uci.edu/ml/datasets/Adult
  - 48842 individuals and their annual income
  - We will use this information to predict if an individual earns **<=50K or >50k** a year

Dataset Information

- Attribute Information:
  - age: continuous
  - workclass: Private,Self-emp-not-inc, Self-emp-inc, Federal-gov, Local-gov, State-gov, Without-pay, Never-worked
  - fnlwgt: continuous
  - education: Bachelors, Some-college, 11th, HS-grad, Prof-school, Assoc-acdm, Assoc-voc...
  - education-num: continuous
  - marital-status: Married-civ-spouse, Divorced, Never-married, Separated, Widowed, Married-spouse-absent...
  - occupation: Tech-support, Craft-repair, Other-service, Sales, Exec-managerial, Prof-specialty, Handlers-cleaners...
  - relationship: Wife, Own-child, Husband, Not-in-family, Other-relative, Unmarried
  - race: White, Asian-Pac-Islander, Amer-Indian-Eskimo, Other, Black
  - sex: Female, Male
  - capital-gain: continuous
  - capital-loss: continuous
  - hours-per-week: continuous
  - native-country: United-States, Cambodia, England, Puerto-Rico, Canada, Germany...
- Target/Label: - <=50K, >50K

Analyzing Flow

- Load data
- Preprocess Data
- Fit and Evaluate Models
  - Logistic Regression
  - Decision Trees
  - Random Forest
- Make Classification

Lab: Running Binary Classification on Zeppelin

- Get the prepared notebook
- Run and try to understand algorithms

References

- [1] https://blogs.oracle.com/bigdata/difference-ai-machine-learning-deep-learning
- [2] https://www.edureka.co/blog/pyspark-mllib-tutorial/
- [3] https://docs.databricks.com/spark/latest/mllib/binary-classification-mllib-pipelines.html