Probability & Statistics – Xác Suất & Thống Kê

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Ngày 12 tháng 10 năm 2024

Tóm tắt nội dung

This text is a part of the series *Some Topics in Advanced STEM & Beyond*:
URL: https://nqbh.github.io/advanced_STEM/.
Latest version:

- *Probability & Statistics – Xác Suất & Thống Kê.*
  PDF: URL: https://github.com/NQBH/advanced_STEM_beyond/blob/main/probability_statistics/NQBH_probability_statistics.pdf.
  TEX: URL: https://github.com/NQBH/advanced_STEM_beyond/blob/main/probability_statistics/NQBH_probability_statistics.tex.

Mục lục

1 Basic

2 Data Science (DS)

3 Deep Learning (DL)

Resources – Tài nguyên.

1. [LBH15]. Yann LeCun, Yoshua Bengio, Geoffrey Hinton. *Deep Learning.*

4 Machine Learning (ML)

Resources – Tài nguyên.

1. Machine Learning cơ bản: https://machinelearningcoban.com/.
2. [Tiệ25]. Vũ Hữu Tiệp. *Machine Learning Cơ Bản.*
   Mã nguồn cuốn ebook "Machine Learning Cơ Bản": https://github.com/tiepvupsu/ebookMLCB.

Definition 1. "Machine learning (ML) *is a field of study in AI concerned with the development & study of statistical algorithms that can learn from data & generalize to unseen data, & thus perform tasks without explicit instructions. Quick progress in the fields of deep learning, beginning in 2010s, allowed neural networks to surpass many previous approaches in performance.*" – *Wikipedia/machine learning*

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"ML finds application in many fields, including natural language processing, computer vision, speech recognition, email filtering, agriculture, & medicine. The application of ML to business problems is known as predictive analysis.

Statistics & mathematical optimization/mathematical programming methods comprise the foundations of machine learning. Data mining is related field of study, focusing on exploratory data analysis (EDA) via unsupervised learning.

From a theoretical viewpoint, probably approximately correct (PAC) learning provides a framework for describing machine learning." – Wikipedia/machine learning

Relationships of ML to AI. As a scientific endeavor, machine learning grew out of the quest for AI. In the early days of AI as an academic discipline, some researchers were interested in having machines learn from data. They attempted to approach the problem with various symbolic methods, as well as what were then termed "neural networks"; these were mostly perceptrons & other models e.g. ADALINE that were later found to be reinventions of the generalized linear models of statistics. Probabilistic reasoning was also employed, especially in automated medical diagnosis. However, an increasing emphasis on the logical, knowledge-based approach caused a rift between AI & machine learning. Probabilistic systems were plagued by theoretical & practical problems of data acquisition & representation.

5 Artificial Intelligence (AI)

Resources – Tài nguyên.

1. [BV14]. Lê Hoài Bắc, Tô Hoài Việt. *Cơ Sở Trí Tuệ Nhân Tạo.*
2. [Aou14]. Joseph E. Aoun. *Robot-Proof: Higher Education in the Age of Artificial Intelligence.*
3. [Aou19]. Joseph E. Aoun. *Robot-Proof: Higher Education in the Age of Artificial Intelligence – Chạy Đua Với Robot: Học Tập Thời Trí Tuệ Nhân Tạo.*

6 Miscellaneous

Tài liệu

[Aou14] Joseph E. Aoun. *Robot-Proof: Higher Education in the Age of Artificial Intelligence*. MIT Publisher, 2014, p. 187.

[Aou19] Joseph E. Aoun. *Robot-Proof: Higher Education in the Age of Artificial Intelligence – Chạy Đua Với Robot: Học Tập Thời Trí Tuệ Nhân Tạo*. Trịnh Huy Nam dịch. Nhà Xuất Bản Thế Giới, 2019, p. 241.

[BV14] Lê Hoài Bắc and Tô Hoài Việt. *Cơ Sở Trí Tuệ Nhân Tạo*. Nhà Xuất Bản Khoa Học & Kỹ Thuật, 2014, p. 229.

[LBH15] Yann LeCun, Yoshua Bengio, and Geoffrey Hinton. "Deep Learning". In: *Nature* 521 (2015), pp. 436–444. DOI: 10.1038/nature14539. URL: https://doi.org/10.1038/nature14539.

[Tiệ25] Vũ Khắc Tiệp. *Machine Learning Cơ Bản*. 2025, p. 422.