PPGEEC2318

Machine Learning

Course Outline

Ivanovitch Silva
ivanovitch.silva@ufrn.br

REFORMA CURRICULAR DO PROGRAMA DE PÓS-GRADUAÇÃO EM ENGENHARIA ELÉTRICA E DE COMPUTAÇÃO (PPgEEC)

Natal, RN, dezembro de 2022.

UNIVERSIDADE FEDERAL DO RIO GRANDE DO NORTE
CENTRO DE TECNOLOGIA
PROGRAMA DE PÓS-GRADUAÇÃO EM ENGENHARIA ELÉTRICA E DE COMPUTAÇÃO
UFRN
CT
PPgEEC

6. **Organização Curricular:**

Disciplinas Básicas do Programa:

Código	Denominação	Créditos	Áreas
PPGEEC2301	Metodologia do Ensino Superior	04	AS, EC, TEL
PPGEEC2302	Metodologia da Pesquisa Científica	04	AS, EC, TEL
PPGEEC2303	Sistemas Lineares	04	AS
PPGEEC2304	Sistemas de Controle	04	AS
PPGEEC2305	Eletrônica de Potência	04	AS
PPGEEC2306	Instrumentação Eletrônica	04	AS
PPGEEC2316	Algoritmos de Engenharia	04	EC
PPGEEC2317	Sistemas Probabilísticos	04	EC, TEL
PPGEEC2318	Aprendizado de Máquina	04	EC
PPGEEC2330	Ondas Guiadas	04	TEL
PPGEEC2331	Engenharia de Micro-Ondas	04	TEL
PPGEEC2332	Teoria de Antenas	04	TEL
PPGEEC2333	Comunicações Móveis	04	TEL

(*) EC = Engenharia de Computação, AS = Automação e Sistemas, TEL = Telecomunicações

Ice Breaker

Text to Image
Image, Text to Image
Text to Video
Image, Text to Video

AI-Generated
(fake image & video)

What challenges do you envision in this reality?

Text, Video to Video

AI-Generated
(fake image & video)

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Atendimento | Cartão Presente

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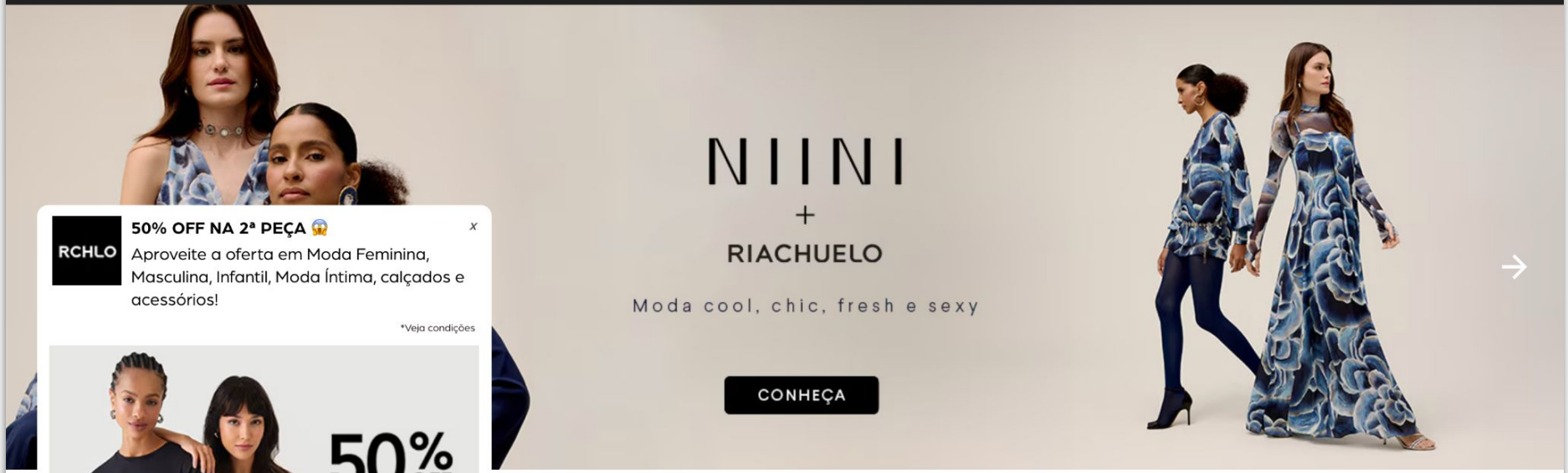
Ver ofertas para a minha região

O que você está procurando?

Bem-vindo! Entre ou cadastre-se

DESTAQUES | FEMININO | MASCULINO | INFANTIL | JEANS | CALÇADOS | ACESSÓRIOS E RELÓGIOS | MARCAS PREMIUM | BELEZA E PERFUME | CASA | ELETRÔNICOS | PERSONAGENS | OUTLET

FRETE GRÁTIS* RETIRANDO EM LOJA. *Veja condições



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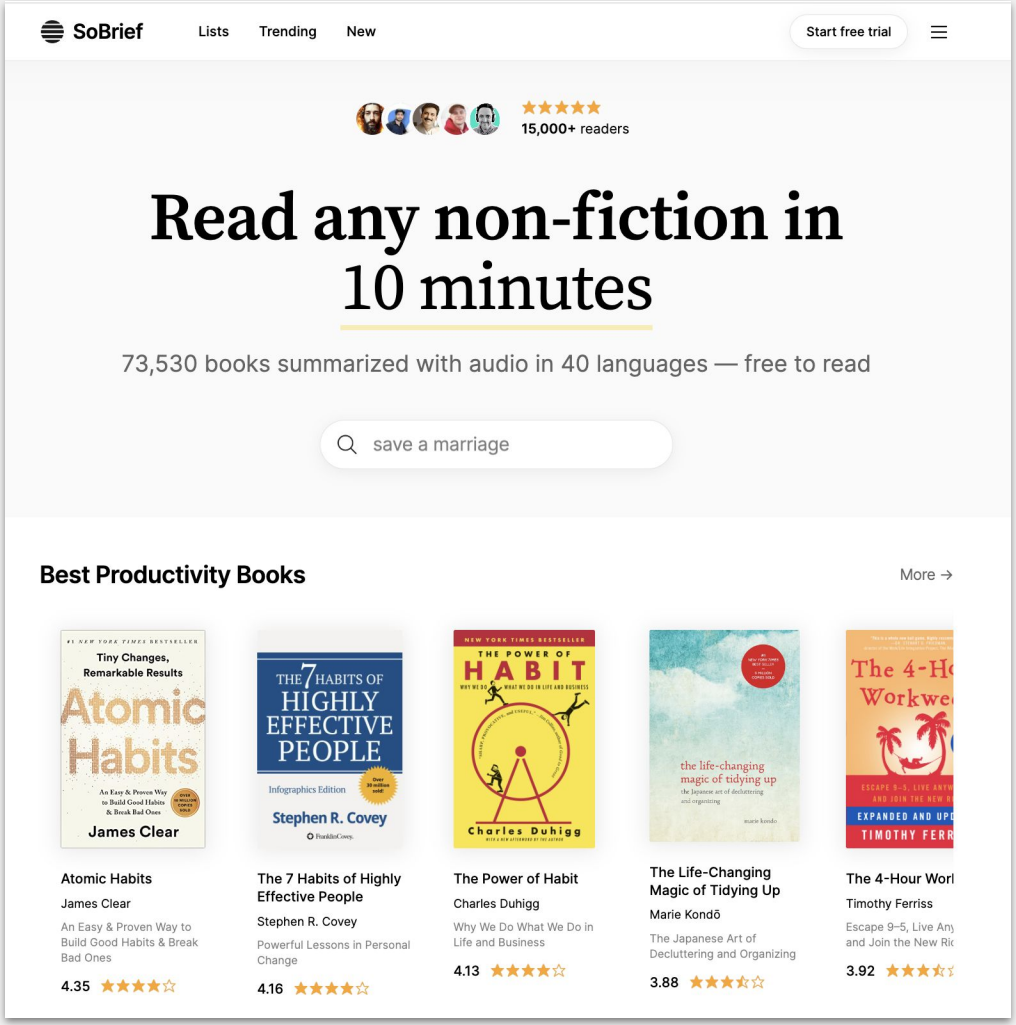
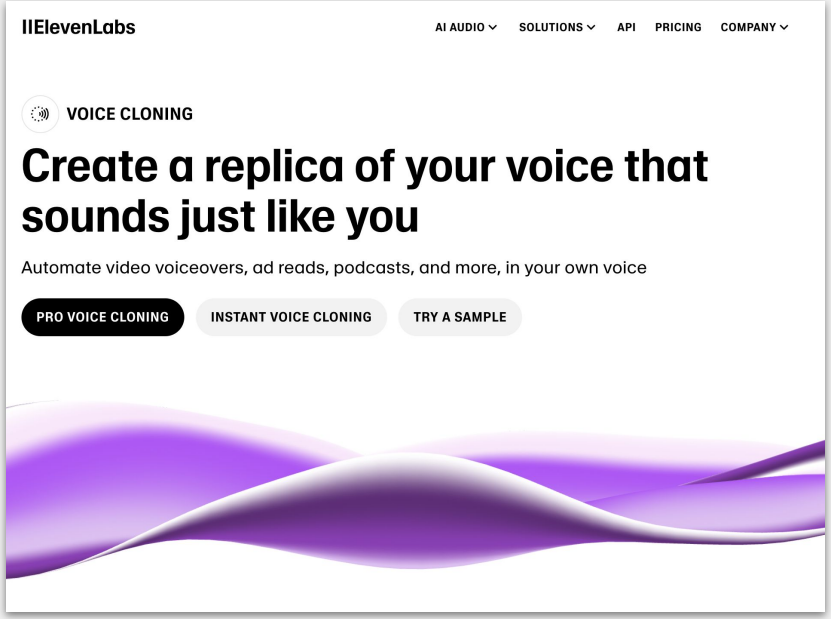
*Veja condições

*Consulte condições em blog.riachuelo.com.br/promocoes-e-regulamentos/


ID.BUZZ





Does the current format of theses and dissertations make sense?

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Artificial Intelligence Index Report 2024

8 min

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PaLM-E: An Embodied Multimodal Language Model

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Generative Agents: Interactive Simulacra of Human Behavior

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Large Language Models Encode Clinical Knowledge

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Position: Levels of AGI for Operationalizing Progress on the Path ...

4 min

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Generative Ghosts: Anticipating Benefits and Risks of AI...

4 min

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Code as Policies: Language Model Programs for Embodi...

4 min

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AI and the Opportunity for Shared Prosperity: Lessons From the...

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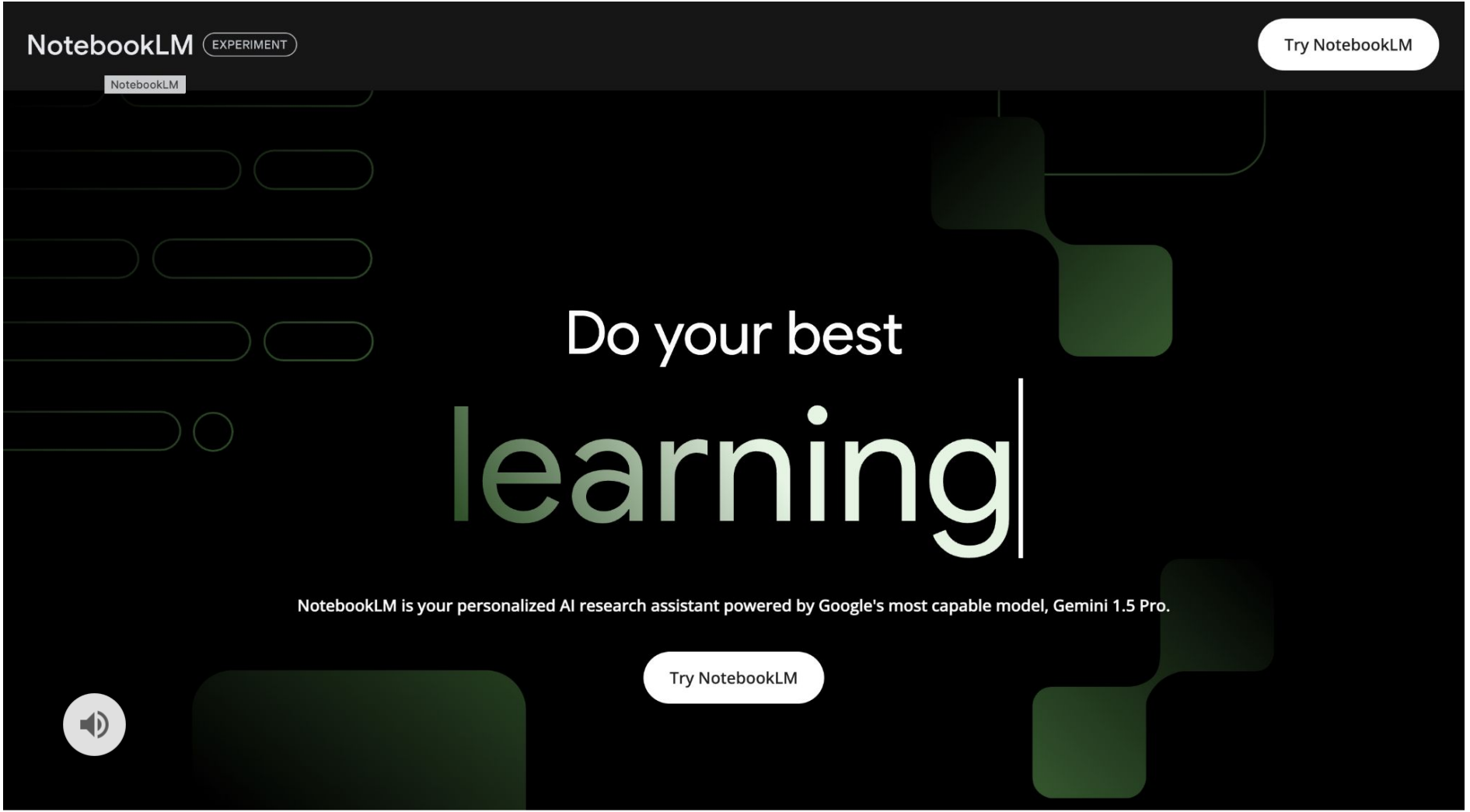
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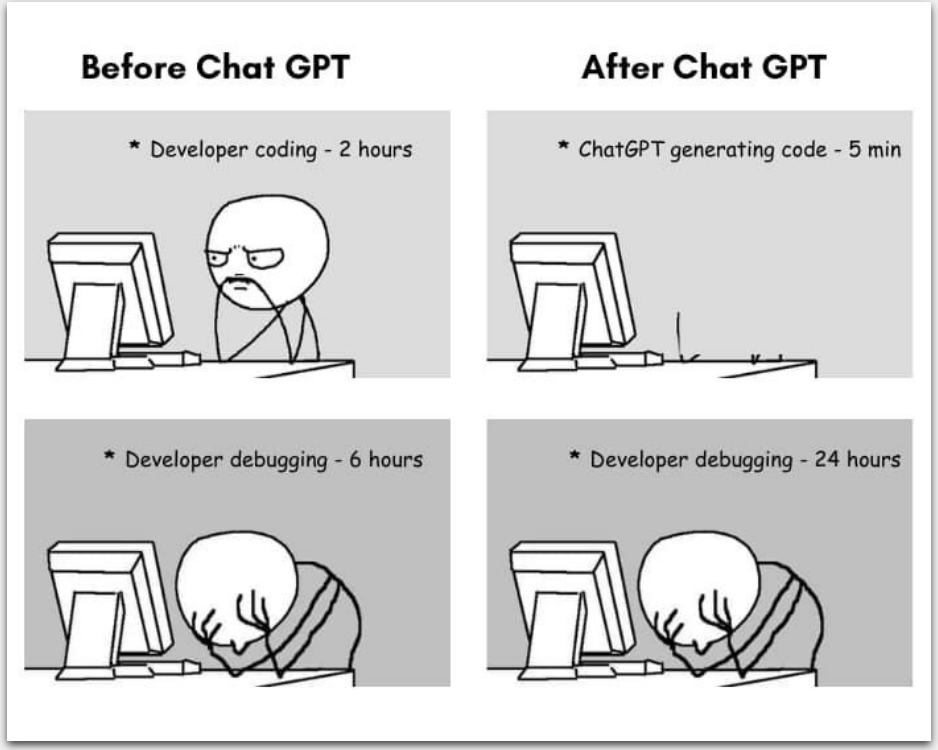
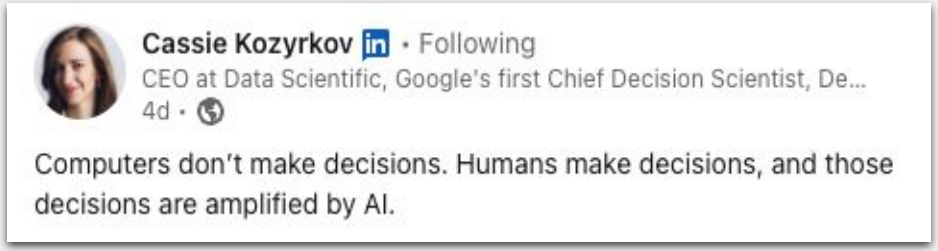


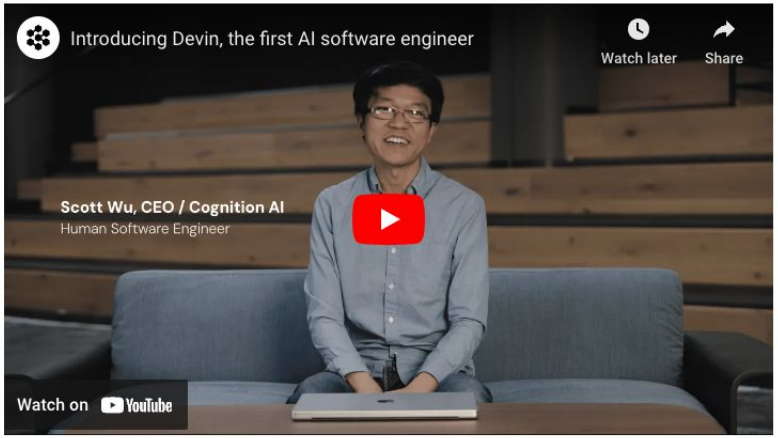


"AI will not replace you. A person using AI will."

We've raised a $21 million Series-A led by Founders Fund. Learn more here.

Cognition

About us Blog



March 12th, 2024 | Written by Scott Wu

Introducing Devin, the first AI software engineer

And setting a new state of the art on the SWE-bench coding benchmark

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Devin is a tireless, skilled teammate, equally ready to build alongside you or independently complete tasks for you to review.

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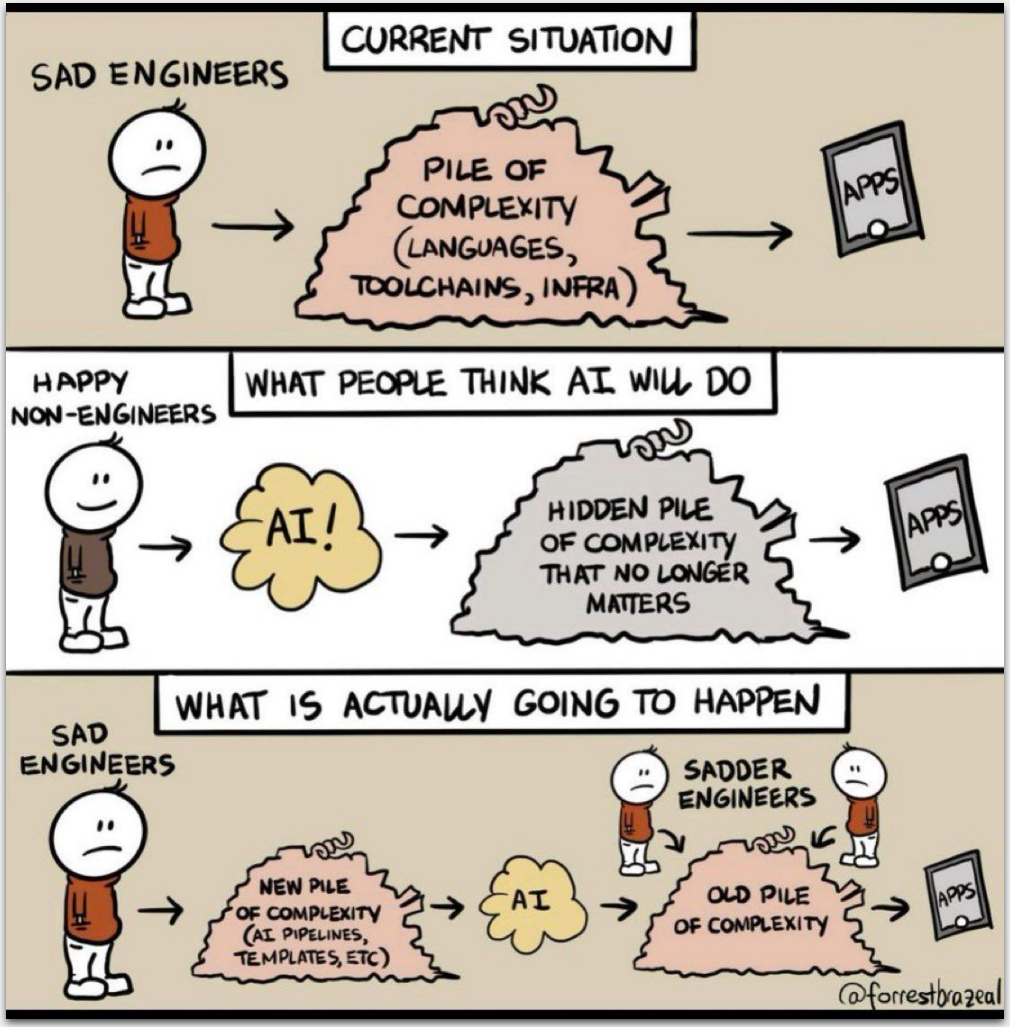
New AI assistant threatens software engineering jobs

Devin has the ability to actively collaborate with users during software development. This includes providing real-time progress updates, accepting feedback, and working together to make design choices.

By Sandeep Budki

InfoWorld | MAR 13, 2024 6:29 AM PDT

https://www.cognition-labs.com/blog



Even with the advent of no-code tools, why do I still have to focus into fundamental stuff?

Contents lists available at ScienceDirect

Surfaces and Interfaces

journal homepage: www.sciencedirect.com/journal/surfaces-and-interfaces

The three-dimensional porous mesh structure of Cu-based metal-organic-framework - aramid cellulose separator enhances the electrochemical performance of lithium metal anode batteries

Manshu Zhang [a,1], Liming Wu [a,1], Tao Yang [b], Bing Zhu [a], Yangai Liu [a,*]

[a] Beijing Key Laboratory of Materials Utilization of Nonmetallic Minerals and Solid Wastes, National Laboratory of Mineral Materials, School of Materials Science and Technology, China University of Geosciences, Beijing100083, China
[b] College of Materials & Environmental Engineering, Hangzhou Dianzi University, Hangzhou 310036, China

ARTICLE INFO

Keywords:
Lithium metal battery
Lithium dendrites
CuMOF-ANFs separator

ABSTRACT

Lithium metal, due to its advantages of high theoretical capacity, low density and low electrochemical reaction potential, is used as a negative electrode material for batteries and brings great potential for the next generation of energy storage systems. However, the production of lithium metal dendrites makes the battery life low and poor safety, so lithium dendrites have been the biggest problem of lithium metal batteries. This study shows that the larger specific surface area and more pore structure of Cu-based metal-organic-framework - aramid cellulose (CuMOF-ANFs) composite separator can help to inhibit the formation of lithium dendrites. After 110 cycles at 1 mA/cm^2, the discharge capacity retention rate of the Li-Cu battery using the CuMOF-ANFs separator is about 96 %. Li-Li batteries can continue to maintain low hysteresis for 2000 h at the same current density. The results show that CuMOF-ANFs composite membrane can inhibit the generation of lithium dendrites and improve the cycle stability and cycle life of the battery. The three-dimensional (3D) porous mesh structure of CuMOF-ANFs separator provides a new perspective for the practical application of lithium metal battery.

1. Introduction

Certainly, here is a possible introduction for your topic:Lithium-metal batteries are promising candidates for high-energy-density rechargeable batteries due to their low electrode potentials and high theoretical capacities [1,2]. However, during the cycle, dendrites forming on the lithium metal anode can cause a short circuit, which can affect the safety and life of the battery [3–9]. Therefore, researchers are indeed focusing on various aspects such as negative electrode structure [10], electrolyte additives [11,12], SEI film construction [13,14], and collector modification [15] to inhibit the formation of lithium dendrites. However, using a separator with high mechanical strength and chemical stability is another promising approach to prevent dendrites from infiltrating the cathode. By incorporating a separator with high mechanical strength, it can act as a physical barrier to impede the growth of dendrites. This barrier can withstand the mechanical stress exerted by the dendrites during battery operation, preventing them from reaching the cathode and causing short circuits or other safety issues. Moreover, chemical stability of the separator is equally important as it ensures that the separator remains intact and does not react or degrade in the presence of the electrolyte or other battery components. A chemically stable separator helps to prevent the formation of reactive species that can further promote dendrite growth. Researchers are actively exploring different materials and designs for separators to enhance their mechanical strength and chemical stability. These efforts aim to create separators that can effectively block dendrite formation, thereby improving the safety and performance of lithium-ion batteries. While there are several research directions to address the issue of dendrite formation, using a separator with high mechanical strength and chemical stability is an important approach to prevent dendrites from infiltrating the cathode and ensure safe operation of lithium metal batteries.

Several types of separators currently used in research include

Surfaces and Interfaces 46 (2024) 104081

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Several types of separators currently used in research include nanoporous polymer separators [16], ceramic composite separators [17], nanofiber separators [18–20], and metal-organic skeleton (MOF) separators [21–24]. While these separators have shown some ability to inhibit the growth of lithium dendrites, they still have some drawbacks,

* Corresponding author.
E-mail address: liuyang@cugb.edu.cn (Y. Liu).
[1] These authors contributed equally.

CNPq
Conselho Nacional de Desenvolvimento Científico e Tecnológico

Chamada CNPq/MCTI/FNDCT Nº 22/2024 – Programa Conhecimento Brasil – Apoio a Projetos em Rede com Pesquisadores Brasileiros no Exterior

O Conselho Nacional de Desenvolvimento Científico e Tecnológico – CNPq, com financiamento do Fundo Nacional de Desenvolvimento Científico e Tecnológico (FNDCT) e seguindo as diretrizes emanadas do Ministério da Ciência, Tecnologia e Inovação – MCTI torna pública a presente Chamada e convidam os interessados a apresentarem propostas nos termos aqui estabelecidos.

1 – Objeto

Apoiar projetos de pesquisa que visem contribuir s
científico e tecnológico e a inovação do País, nas divers
com pesquisadores brasileiros radicados no exterior.

1.1 – São objetivos e diretrizes desta chamada:

a) Apoiar a execução de projetos em Instituições de Ens
de Ciência e Tecnologia – ICT, localizadas no Brasil, em
radicados em instituições de ensino, pesquisa e desenv

b) Estimular o intercâmbio de conhecimento entre pes
com pesquisadores brasileiros radicados no exterio
ferramentas e processos que envolvam Inteligência Artificial.

c)

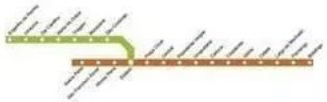
6.7 – Será aceita uma única proposta por proponente. Os projetos terão vigência inicial de até 24 meses.

6.8 – Na hipótese de envio de mais de uma proposta pelo mesmo proponente, respeitando-se o prazo limite estipulado para submissão das propostas, será considerada para análise somente a última proposta recebida.

6.9 – Constatado o envio de propostas idênticas, apresentadas por diferentes proponentes, todas as propostas nesta condição serão indeferidas.

6.10 – Recomenda-se ao proponente que informe se na elaboração e redação da proposta foi utilizado instrumento de Inteligência Artificial. Esta informação tem caráter consultivo, não tendo impacto no julgamento da proposta.

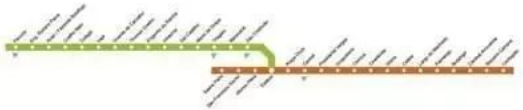
Rio de Janeiro, 1993



Xangai, 1993

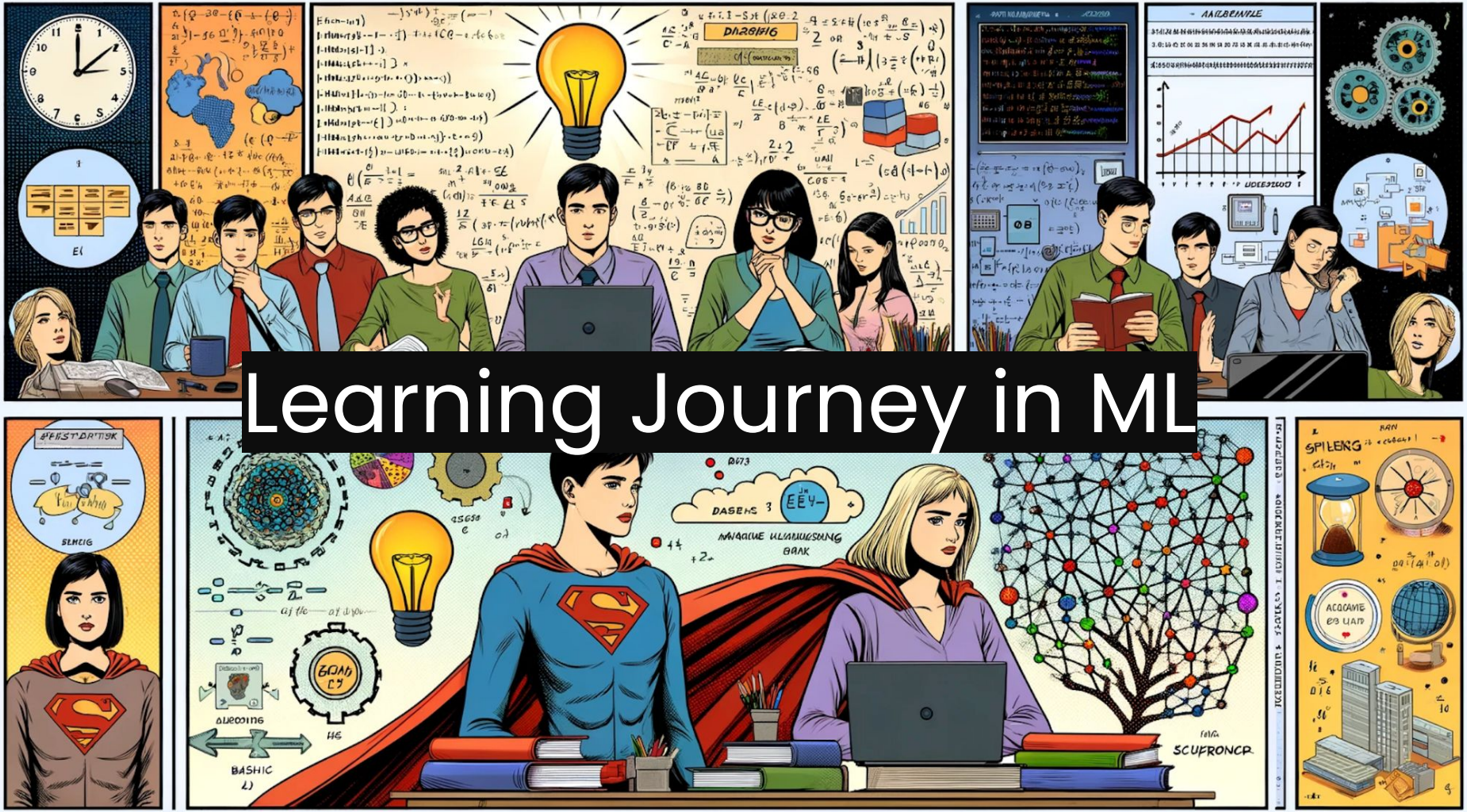
(sem metrô)

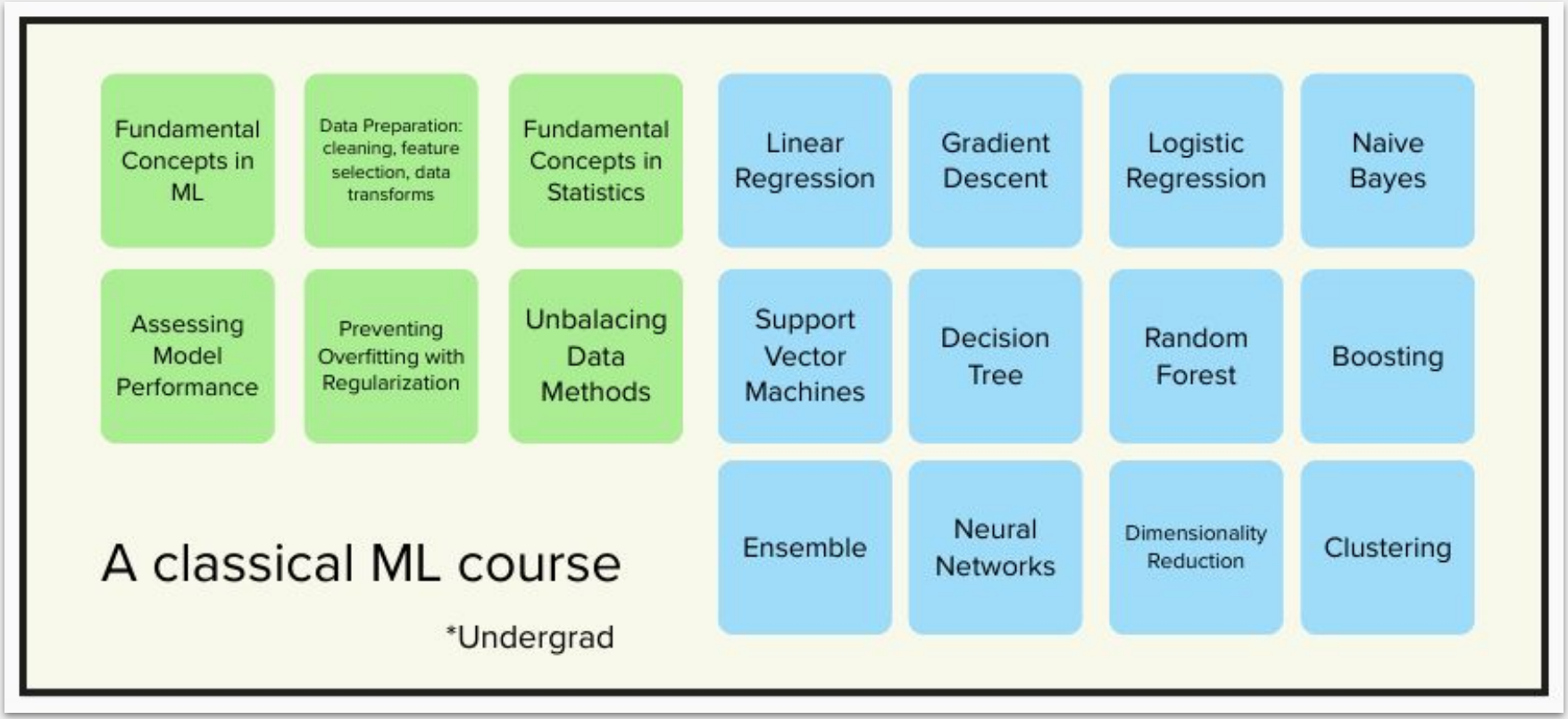
Rio de Janeiro, 2013

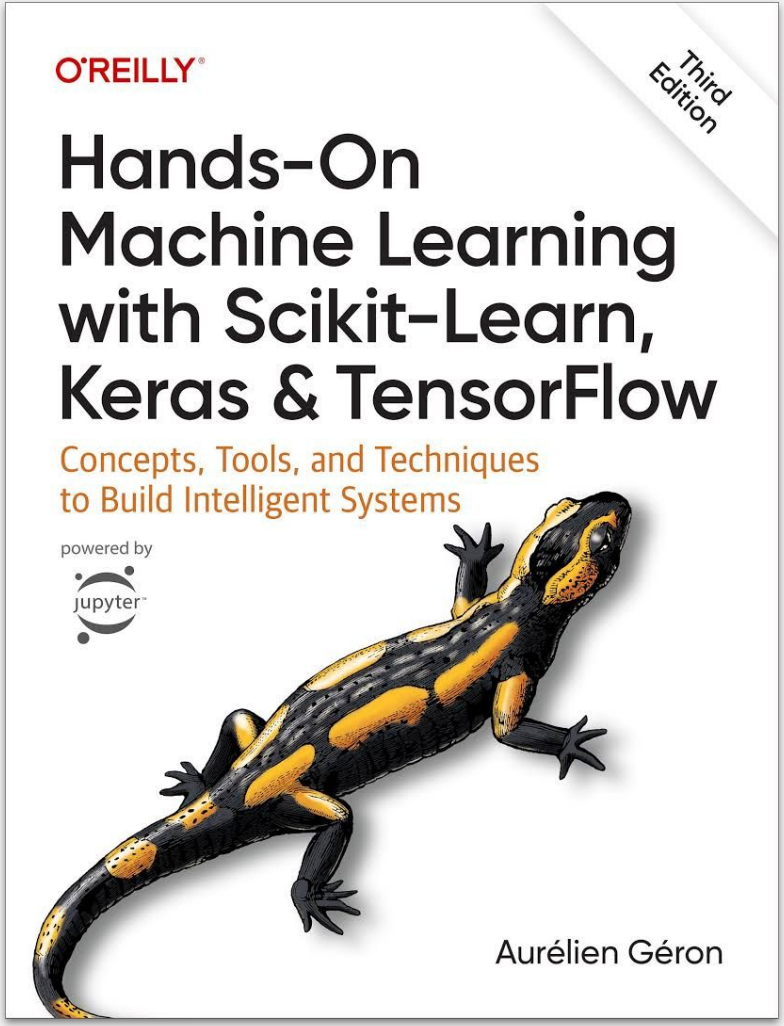


Xangai, 2013

How does this metaphor fit into our learning journey, really?


Learning Journey in ML


Fundamental Concepts in ML
Data Preparation: cleaning, feature selection, data transforms
Fundamental Concepts in Statistics
Linear Regression
Gradient Descent
Logistic Regression
Naive Bayes
Assessing Model Performance
Preventing Overfitting with Regularization
Unbalacing Data Methods
Support Vector Machines
Decision Tree
Random Forest
Boosting
Ensemble
Neural Networks
Dimensionality Reduction
Clustering
A classical ML course
*Undergrad


O'REILLY
Third Edition
Hands-On Machine Learning with Scikit-Learn, Keras & TensorFlow
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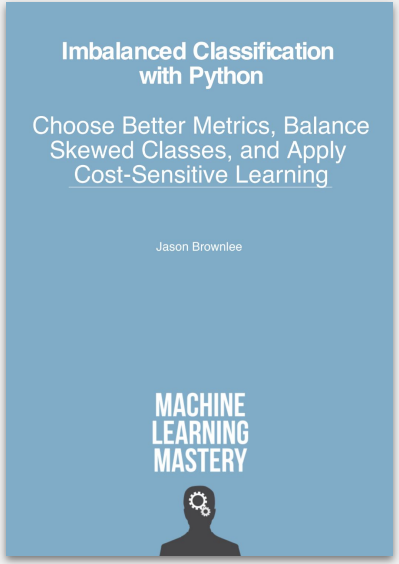
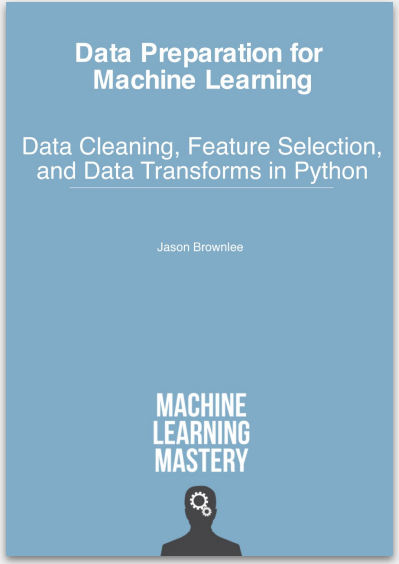
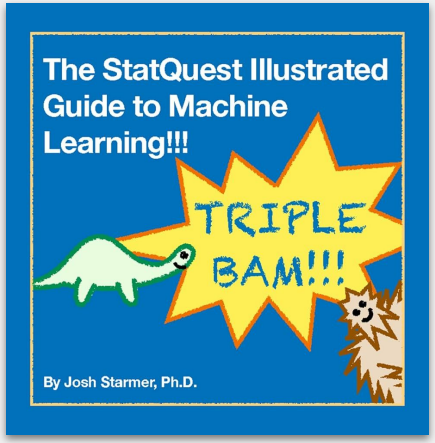
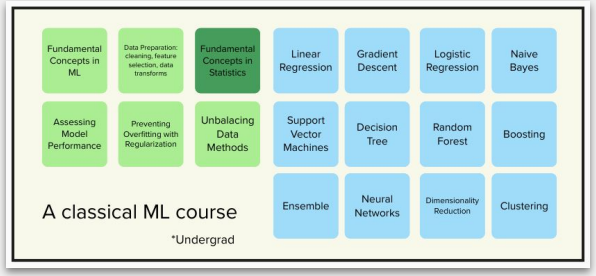
powered by
jupyter
Aurélien Géron


Imbalanced Classification with Python
Choose Better Metrics, Balance Skewed Classes, and Apply Cost-Sensitive Learning
Jason Brownlee
MACHINE LEARNING MASTERY


Data Preparation for Machine Learning
Data Cleaning, Feature Selection, and Data Transforms in Python
Jason Brownlee
MACHINE LEARNING MASTERY


The StatQuest Illustrated Guide to Machine Learning!!!
TRIPLE BAM!!!
By Josh Starmer, Ph.D.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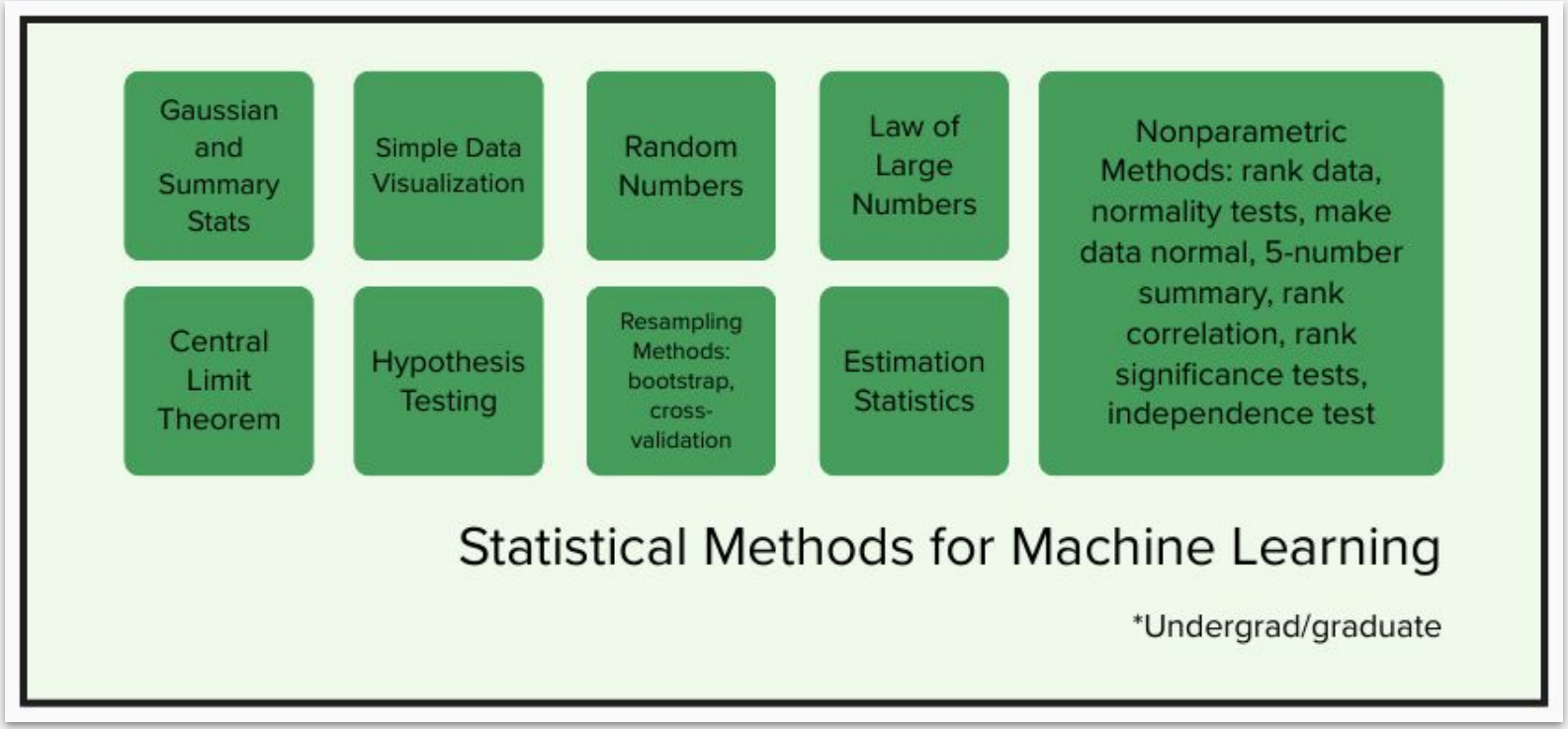

Gaussian and Summary Stats
Simple Data Visualization
Random Numbers
Law of Large Numbers
Nonparametric Methods: rank data, normality tests, make data normal, 5-number summary, rank correlation, rank significance tests, independence test
Central Limit Theorem
Hypothesis Testing
Resampling Methods: bootstrap, cross-validation
Estimation Statistics
Statistical Methods for Machine Learning
*Undergrad/graduate

Statistical Methods for Machine Learning

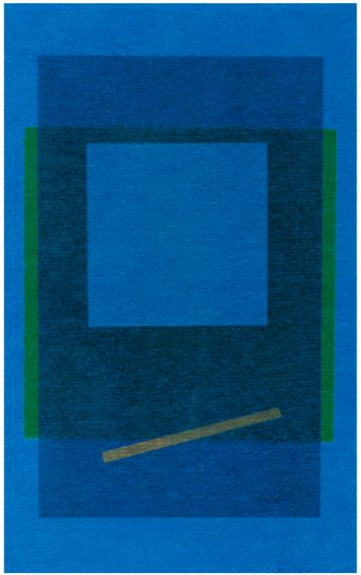
Discover how to Transform Data into Knowledge with Python

Jason Brownlee

MACHINE LEARNING MASTERY

Noções de Probabilidade e Estatística

Marcos Nascimento Magalhães
Antonio Carlos Pedroso de Lima



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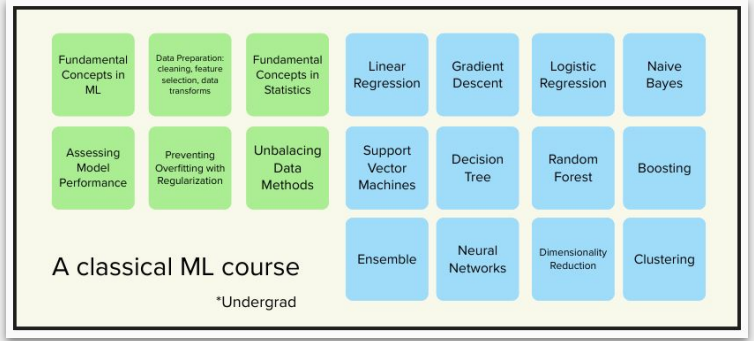
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ML on Mobile and Edge IoT devices
Quantization
Prunning
Model Convertion
Frameworks and Applications
Post Training Quantization
Knowledge Diistillation
Hardware Specification
TinyML Course
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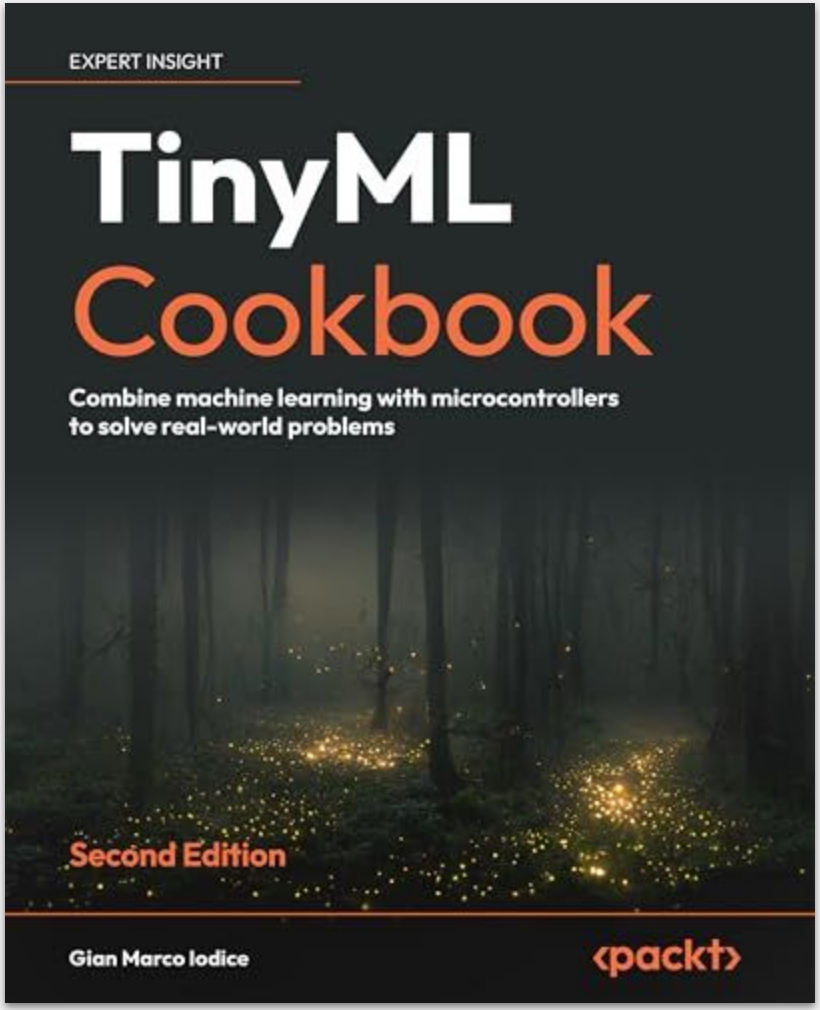
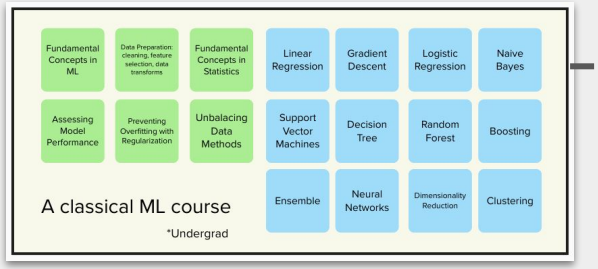
Profiling and Optimization
Quantization Aware Training
Running an LLM on a Embedded Device
From Cloud to Edge: rethinking Generative AI for Low Resrouce Desing





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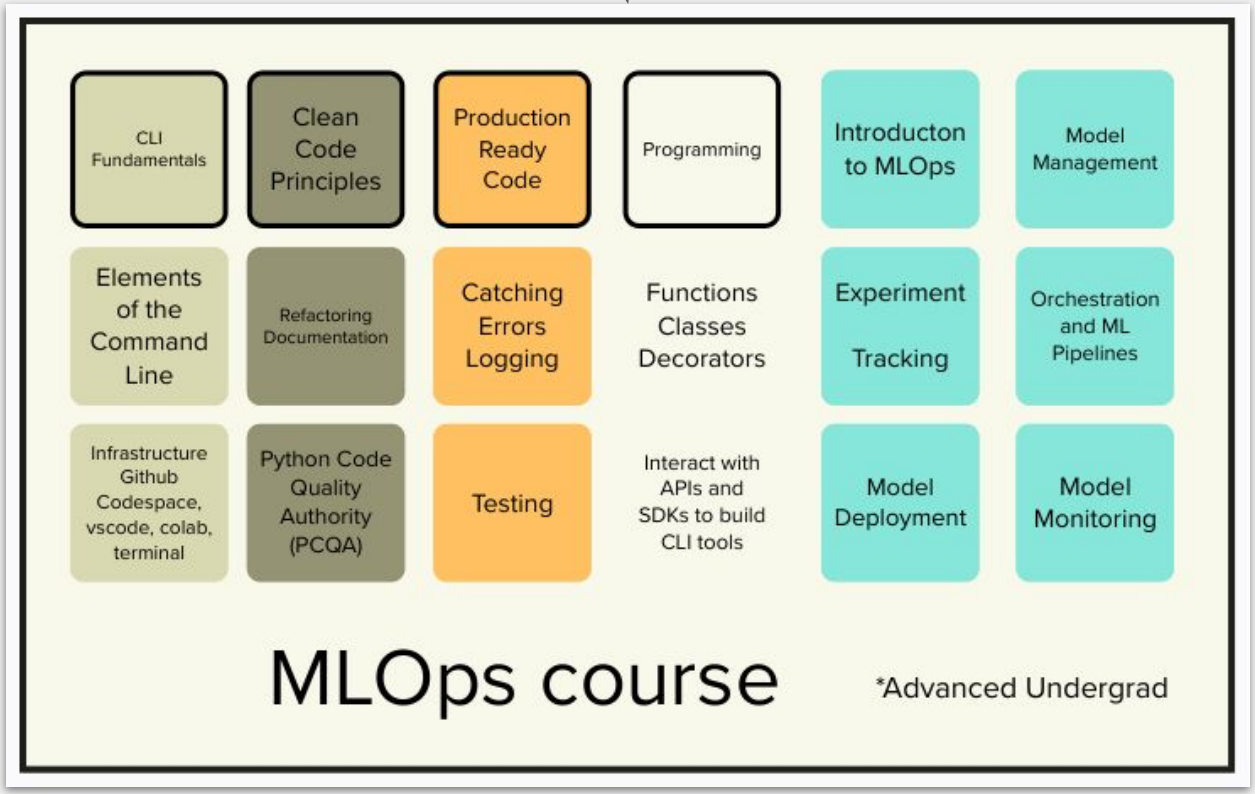
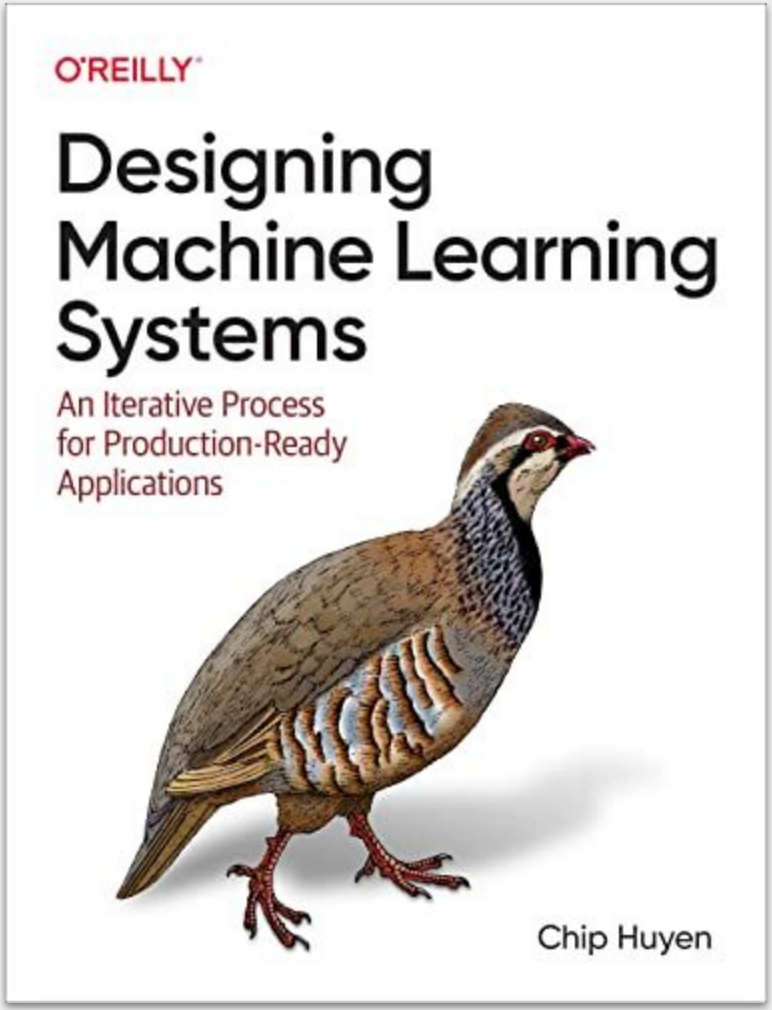
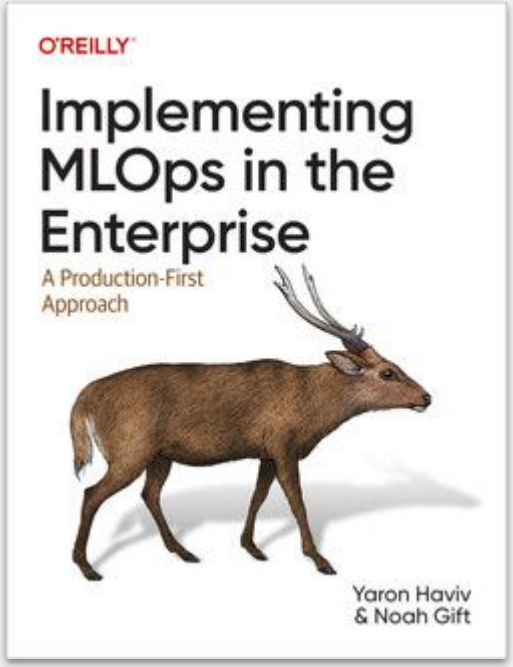


Learn how to design, build, deploy, and scale machine learning systems to solve real-world problems.





https://noahgift.com/courses/latest/

Go, Python, Rust, and production AI applications

March 11, 2024

In this article, I'll talk about Go, Python, and Rust, and each language's role in building AI-powered applications.

Sameer Ajmani

he/him · Brooklyn, NY, USA

Engineering Director at Google

https://ajmani.net/2024/03/11/go-python-rust-and-production-ai-applications

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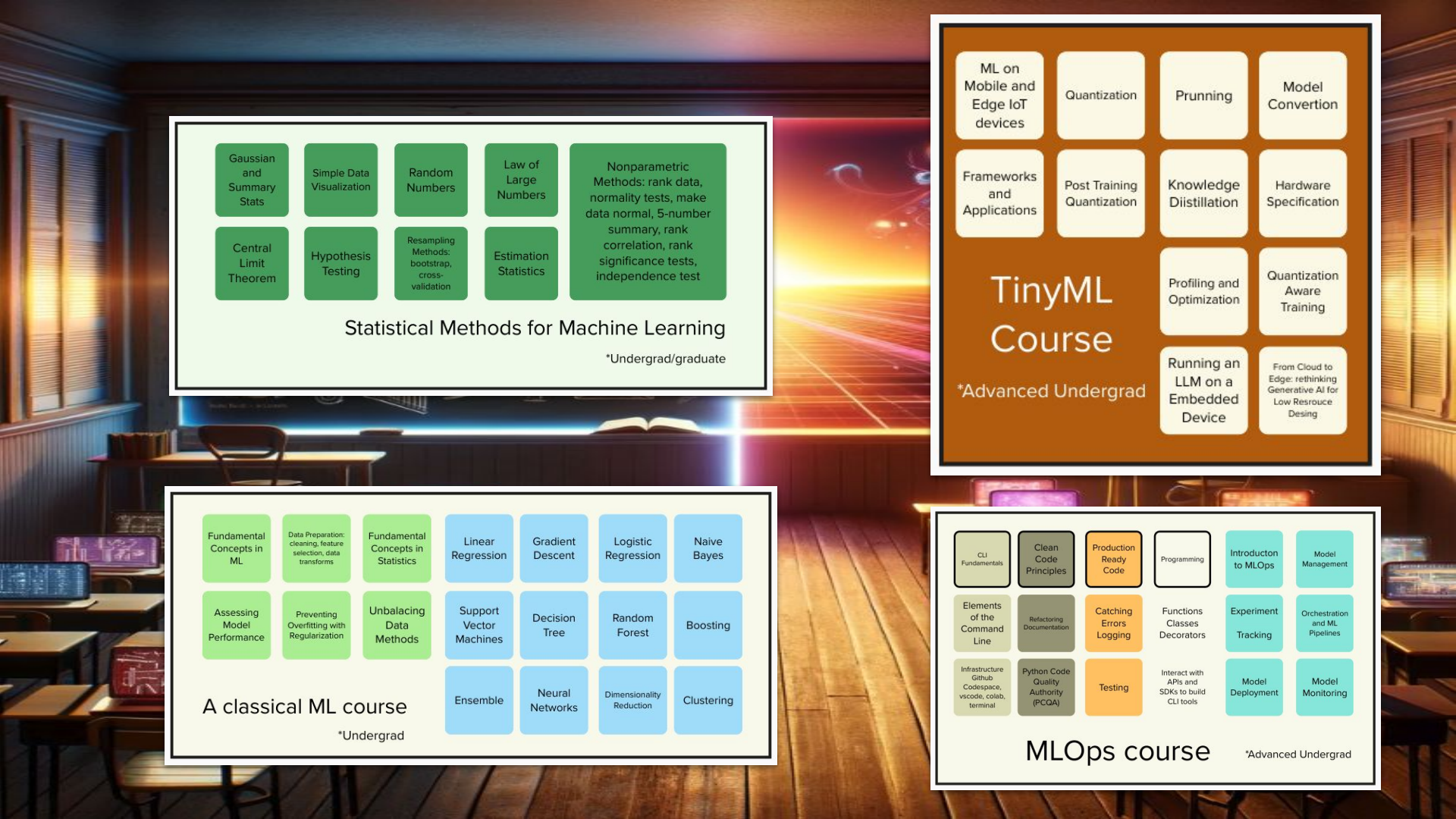
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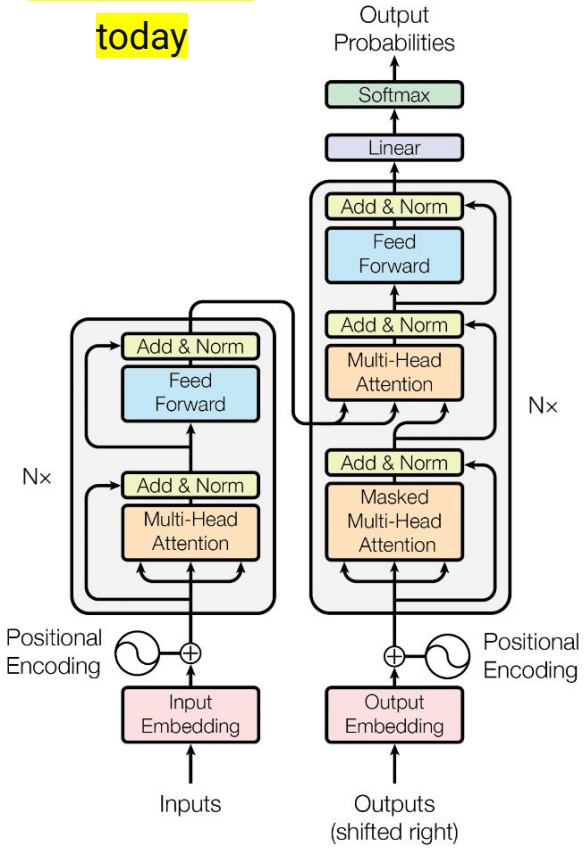

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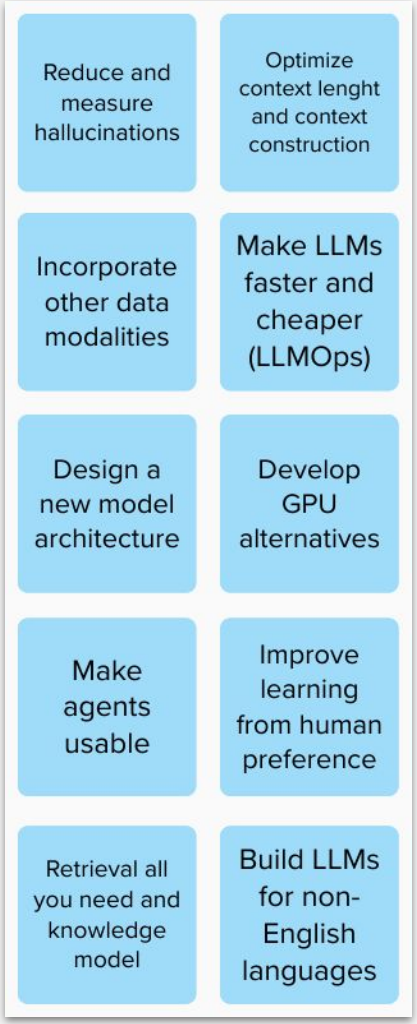
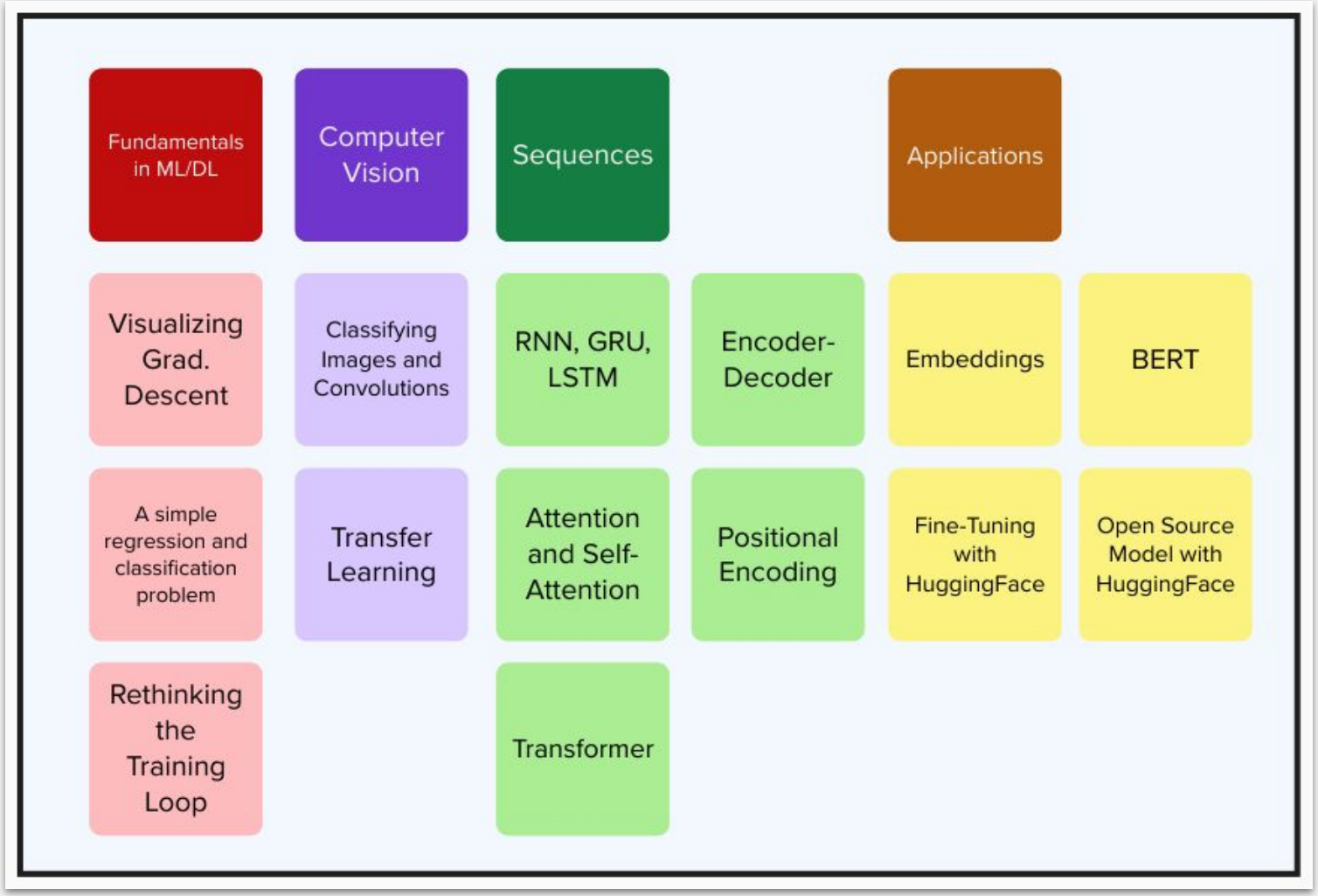
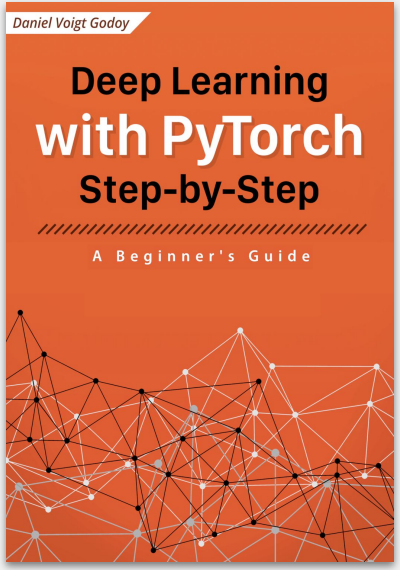


Course Syllabus

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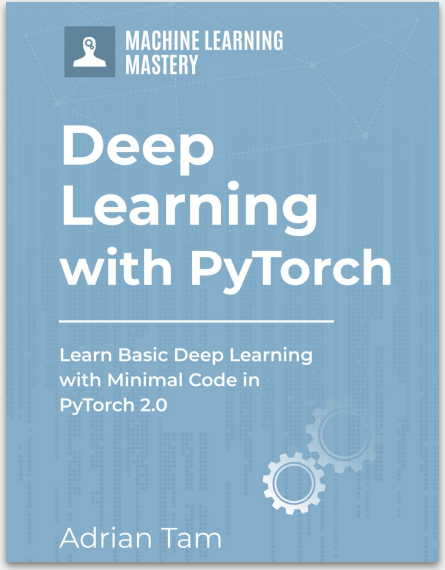
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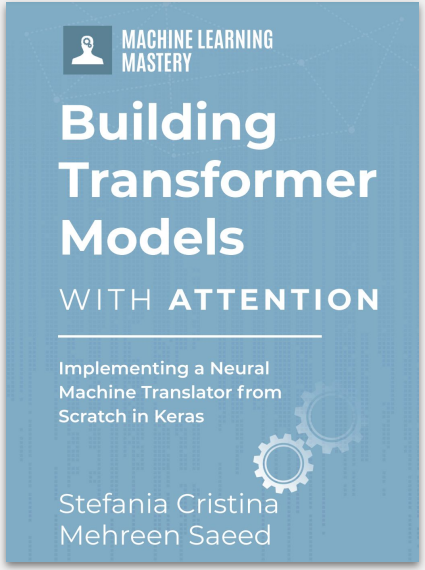
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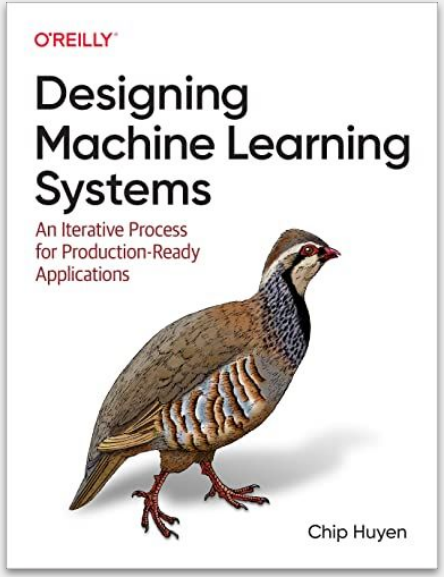
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