

Come iniziare una carriera in Machine Learning: la mia esperienza

Soel Micheletti · Dicembre 2024

Cantonale
di Locarno





2013-2017



Settembre 2017

ETH zürich

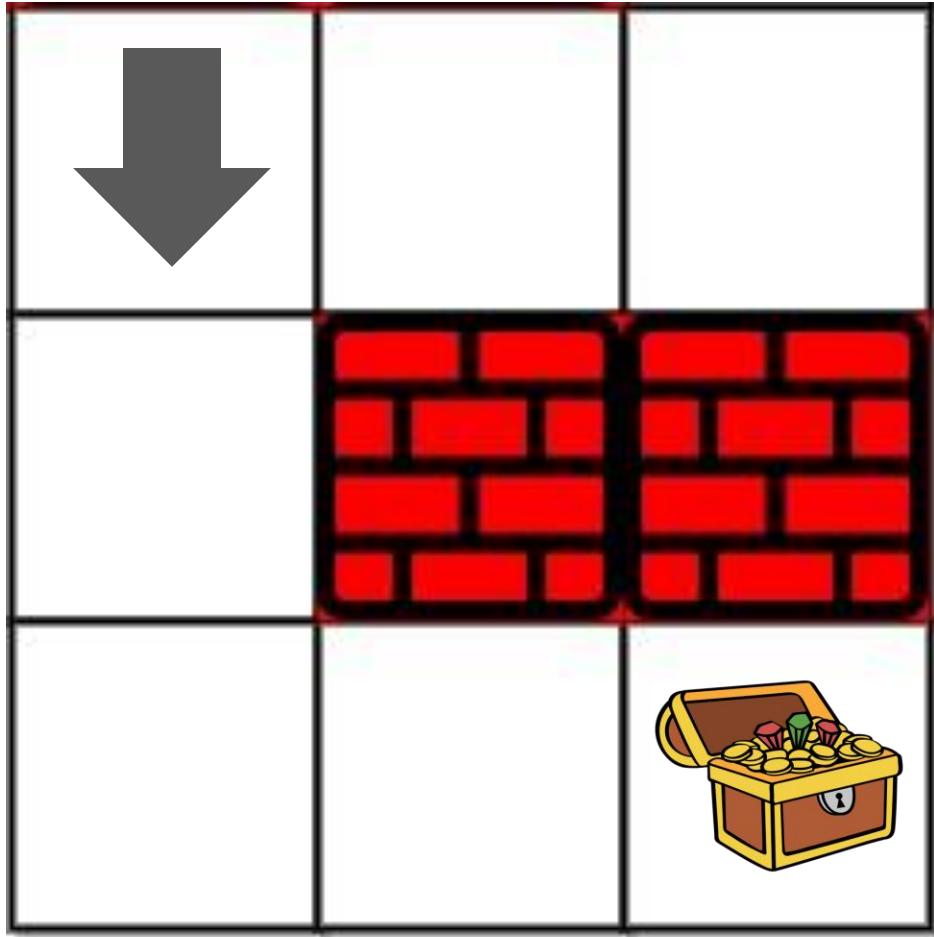


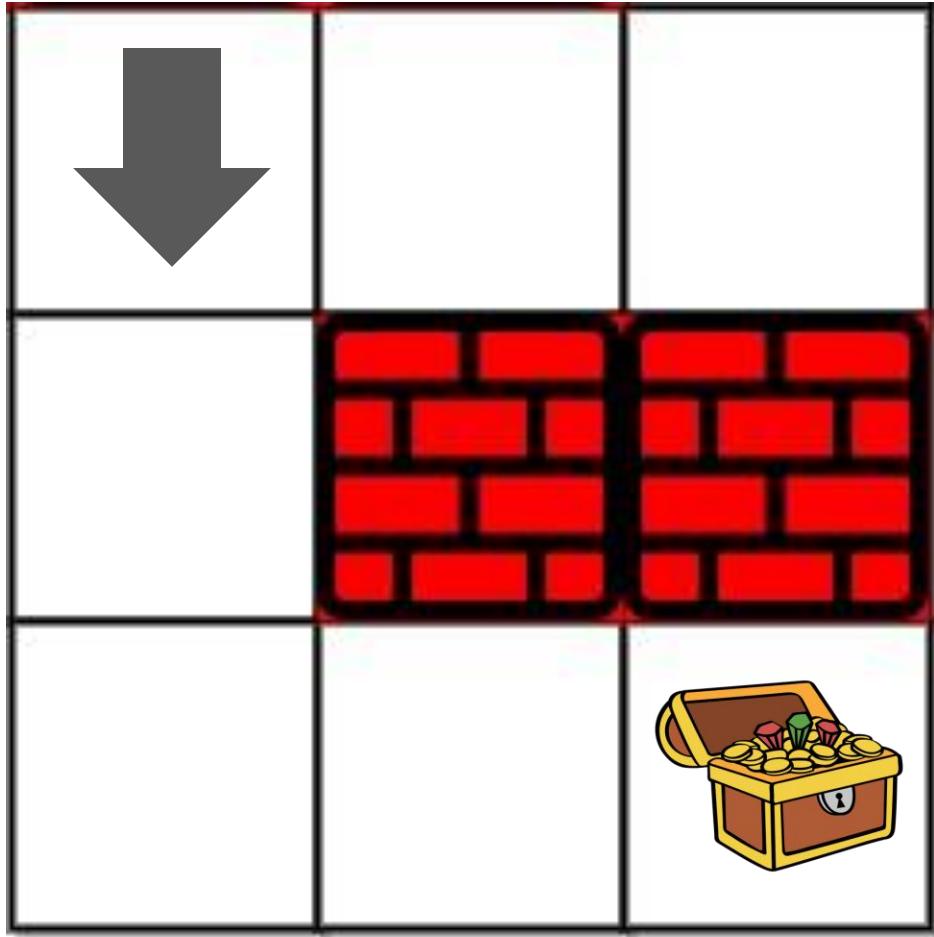


Introduction to Machine Learning 2020

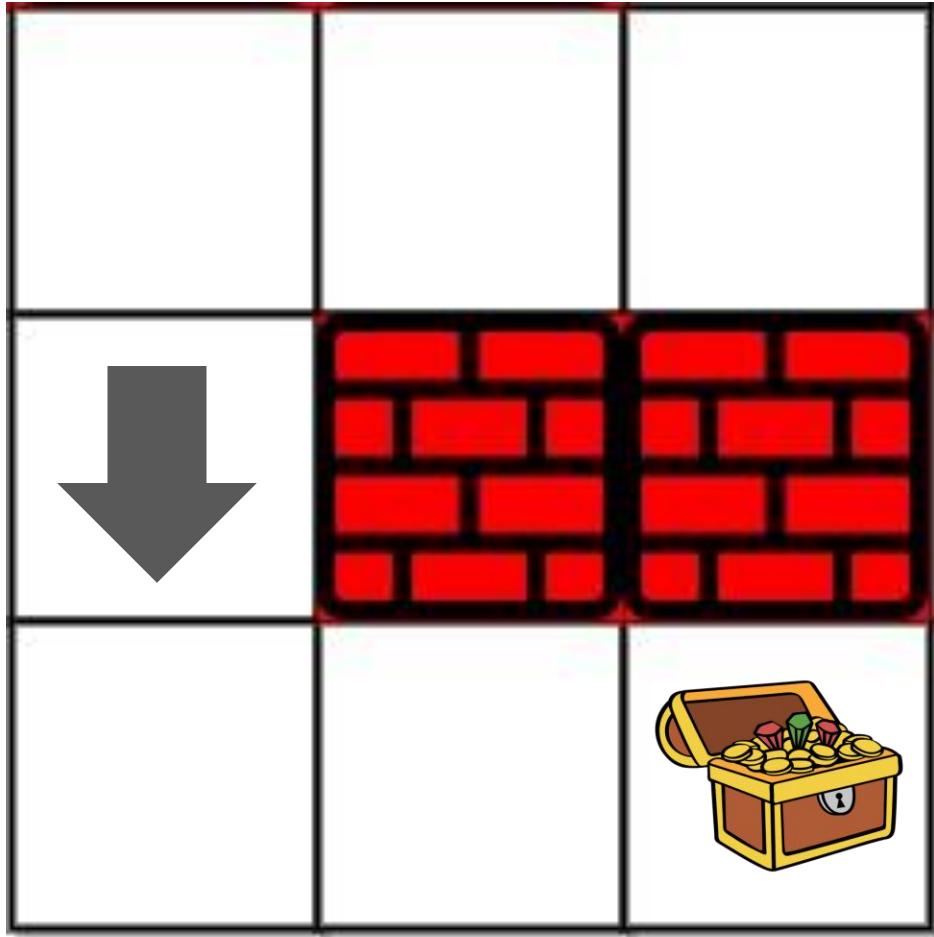
Introduction to Machine Learning

The course will introduce the foundations of learning and making predictions from data. We will study basic concepts such as trading goodness of fit and model complexity. We will discuss important machine learning algorithms used in practice, and provide hands-on experience in a course project. VVZ Information is available [here](#).

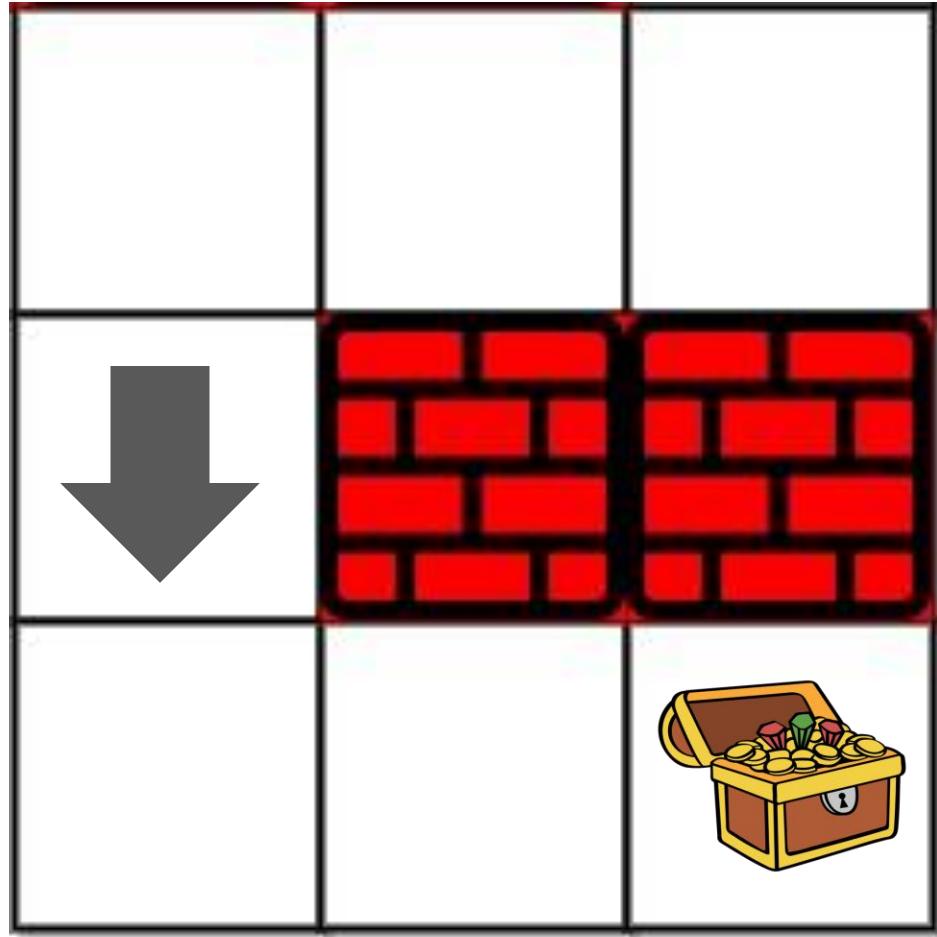




1. Avanza

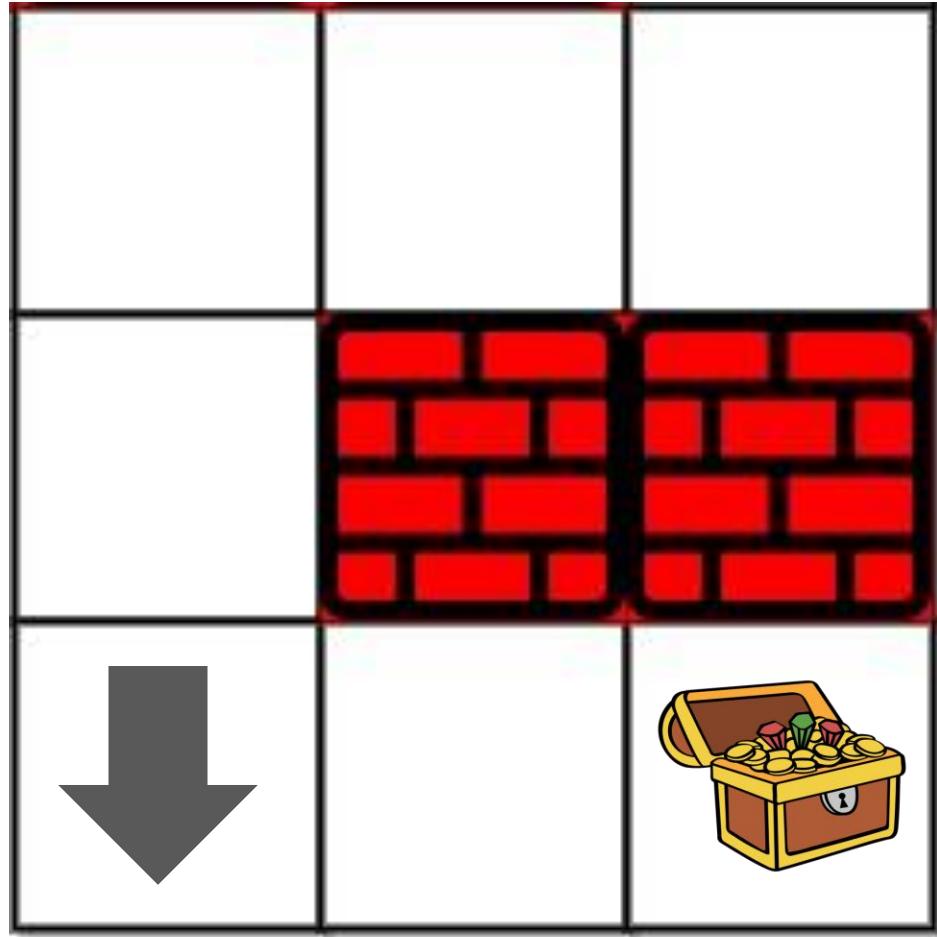


1. Avanza



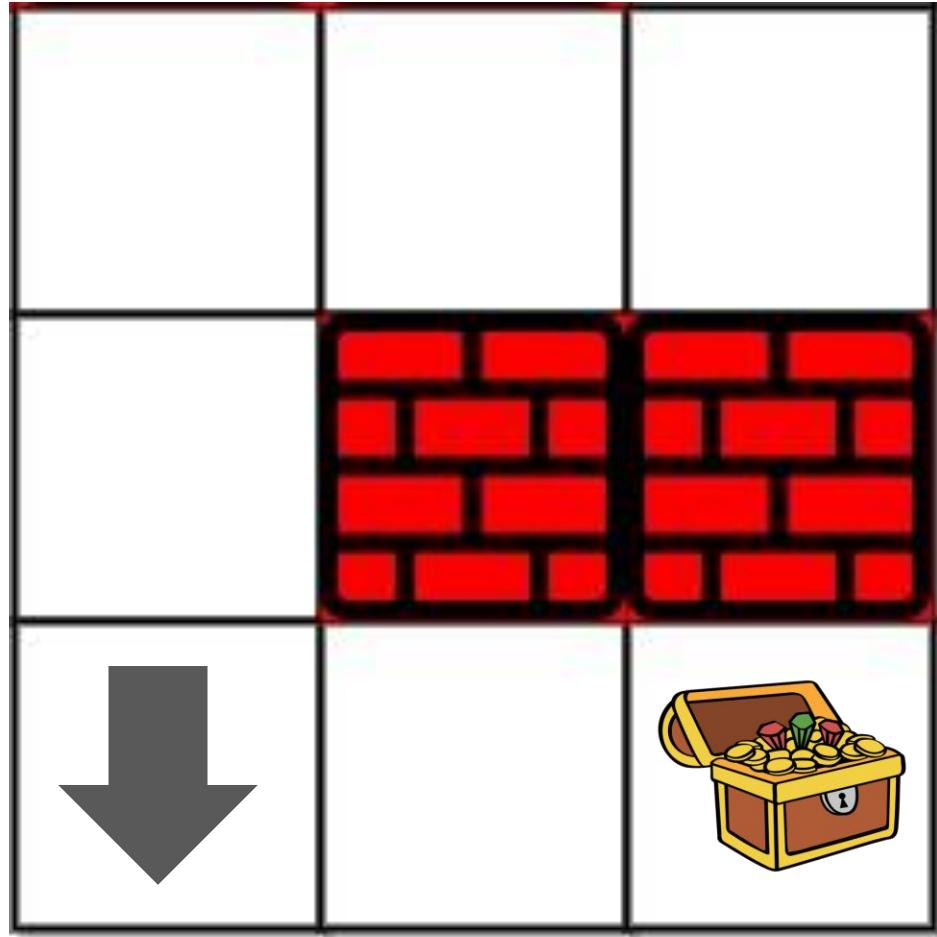
1. Avanza

2. Avanza

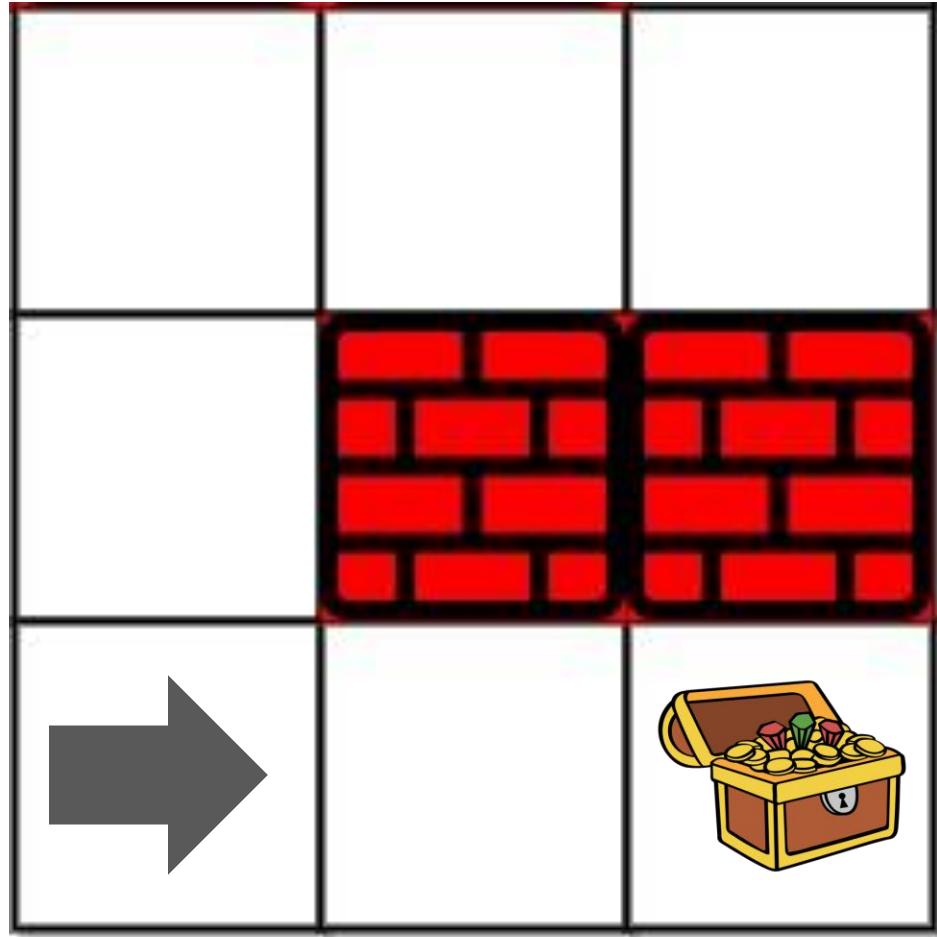


1. Avanza

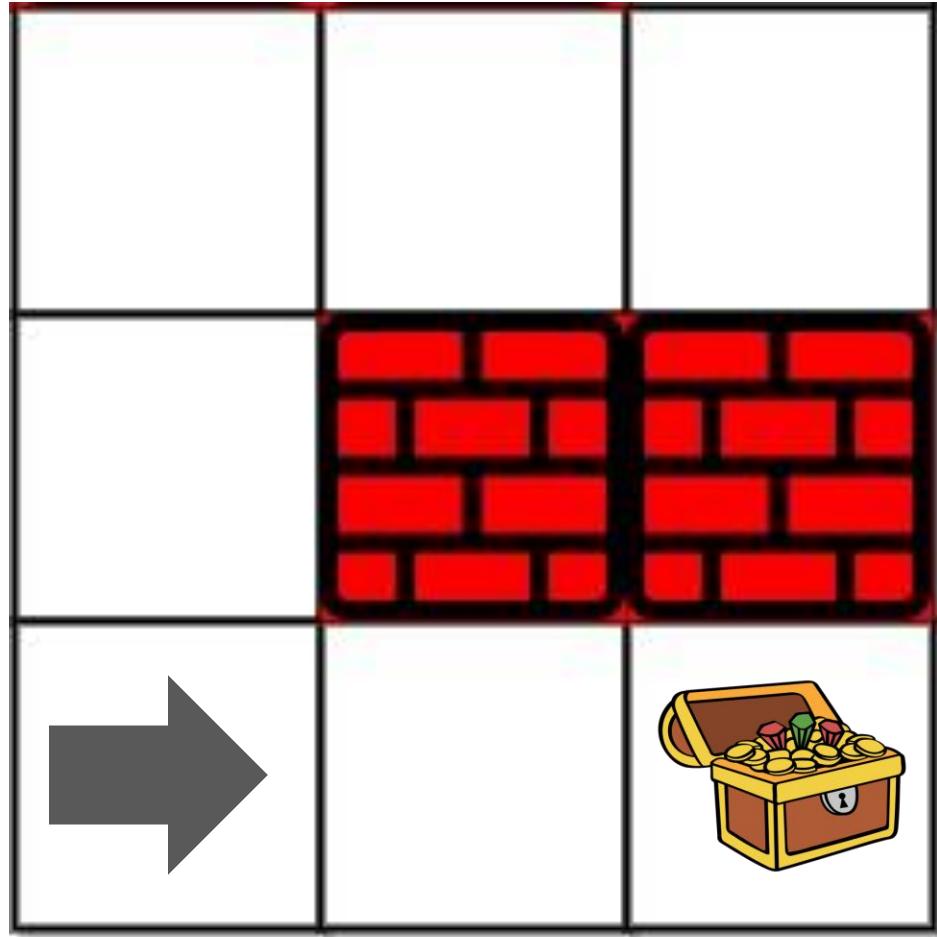
2. Avanza



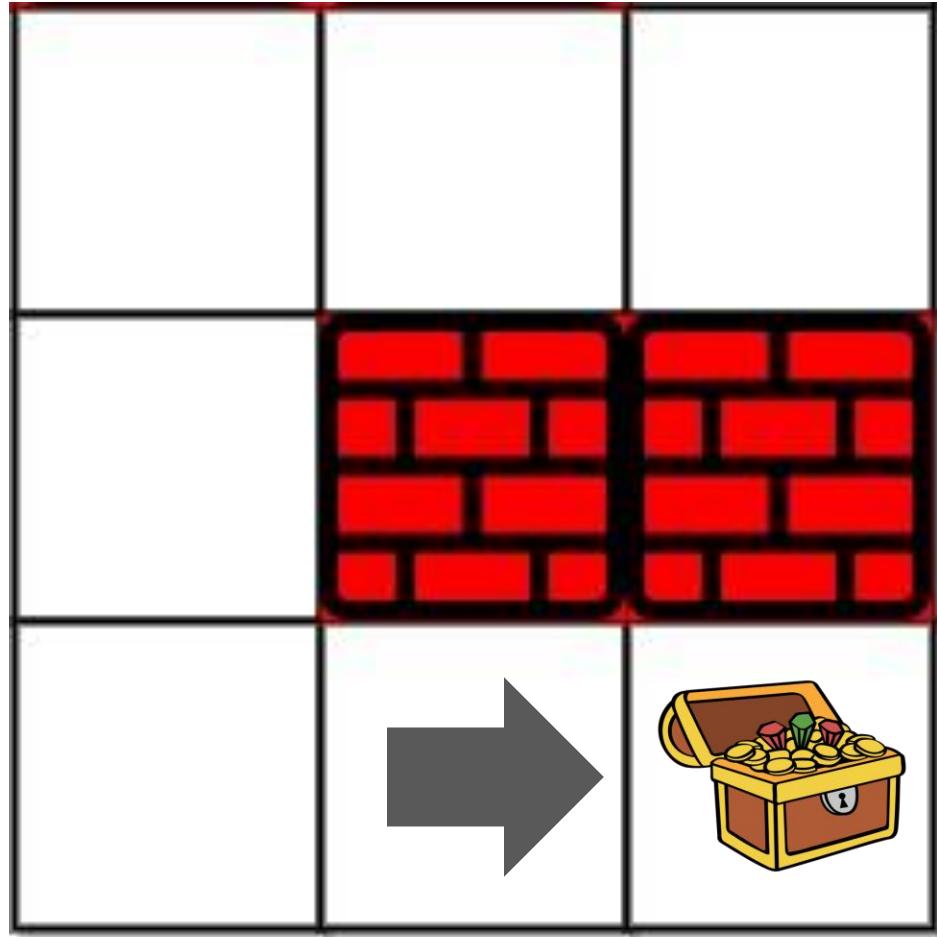
1. Avanza
2. Avanza
3. Gira a sinistra di 90 gradi



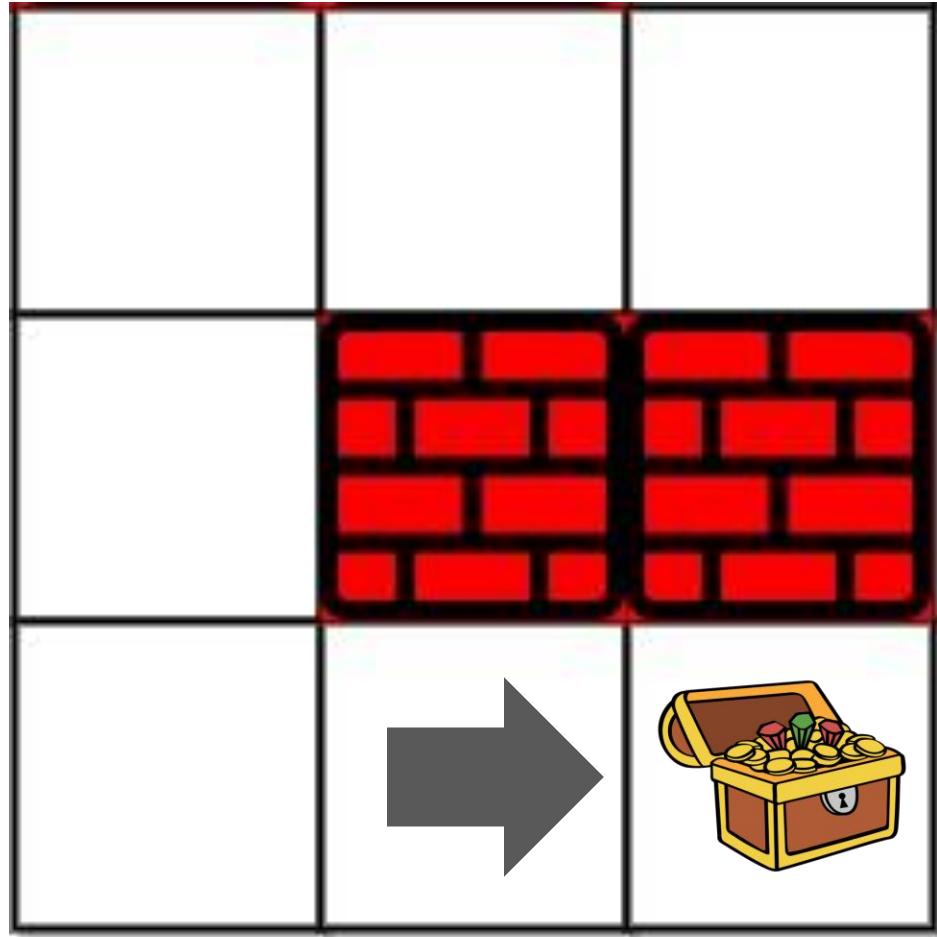
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2. Avanza
3. Gira a sinistra di 90 gradi



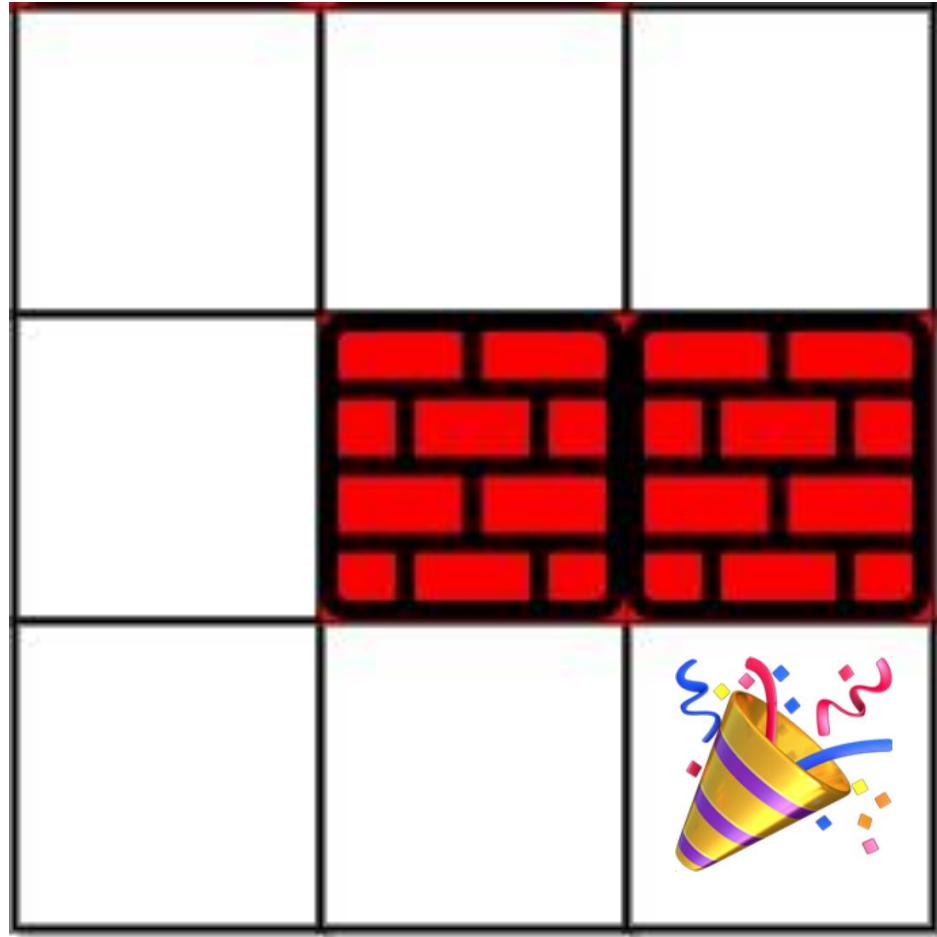
1. Avanza
2. Avanza
3. Gira a sinistra di 90 gradi
4. Avanza



1. Avanza
2. Avanza
3. Gira a sinistra di 90 gradi
4. Avanza

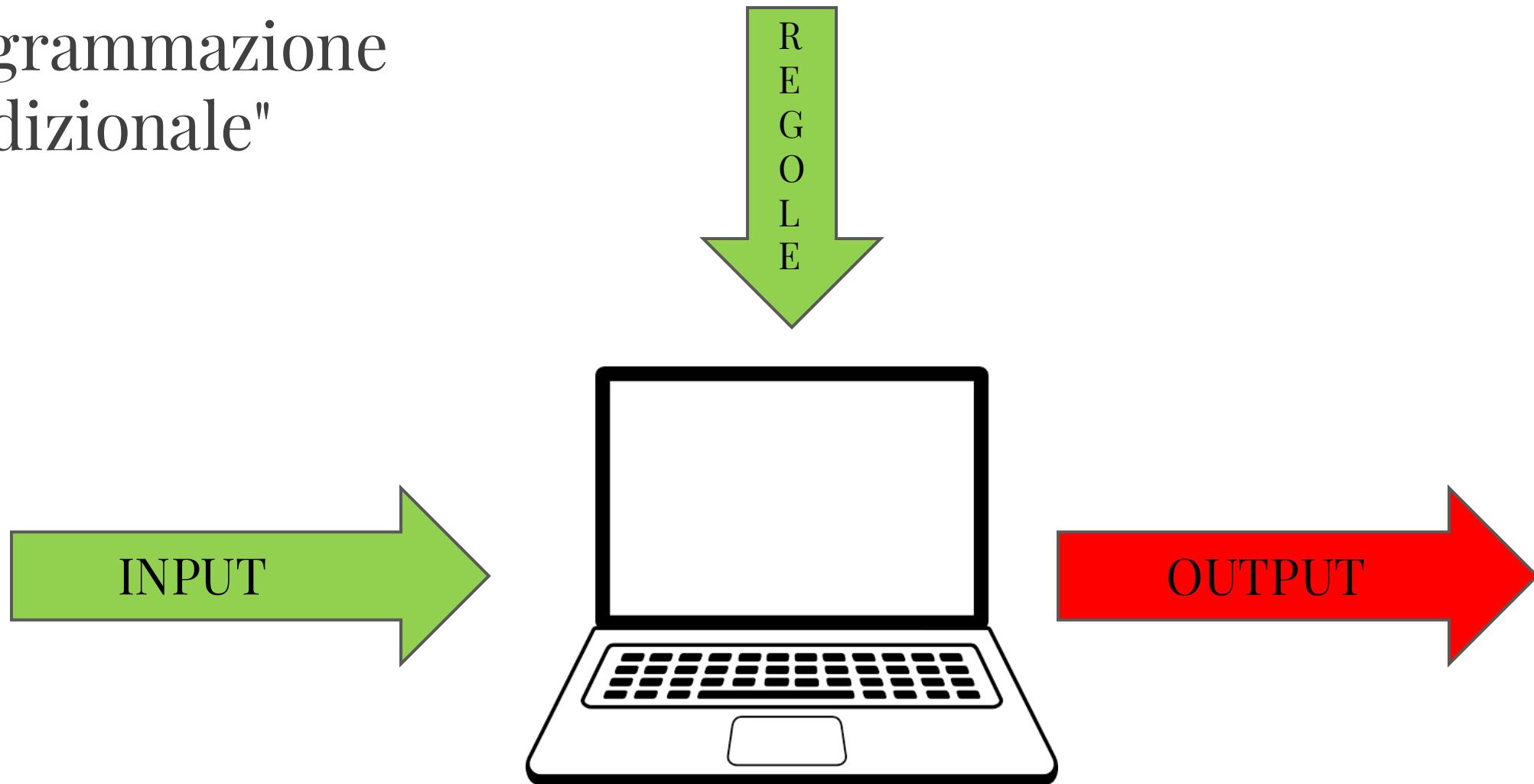


1. Avanza
2. Avanza
3. Gira a sinistra di 90 gradi
4. Avanza
5. Avanza

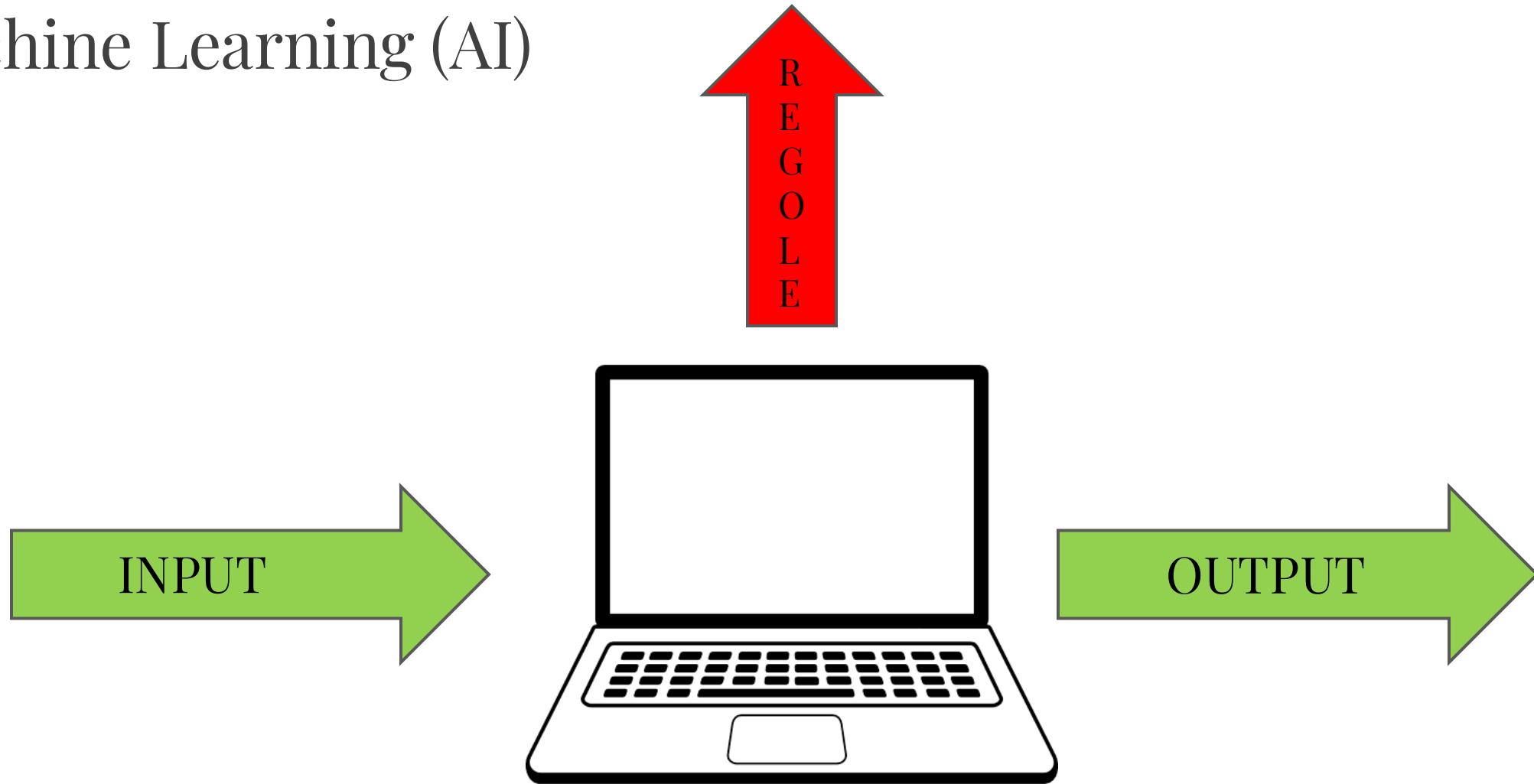


1. Avanza
2. Avanza
3. Gira a sinistra di 90 gradi
4. Avanza
5. Avanza

Programmazione "tradizionale"



Machine Learning (AI)



$$Y = f(X)$$

$$Y = f(X)$$

Cane = f ()



Gatto = f ()



Gatto = f ()



Cane = f ()



Dopo abbastanza
esempi...

? = f ()



Cane = f ()



Obiettivo del supervised learning

Trovare una buona funzione f che mappa l'input X all'output Y in modo
che l'errore sia il più piccolo possibile...

Obiettivo del supervised learning

Trovare una buona funzione f che mappa l'input \mathbf{X} all'output \mathbf{Y} in modo
che l'errore sia il più piccolo possibile... su **nuovi dati**

Applicazioni del Machine Learning



Applicazioni del Machine Learning



Applicazioni del Machine Learning



Applicazioni del Machine Learning



What can I help with?

Message ChatGPT

✉️

↑

Create image Code Brainstorm Analyze data Surprise me More

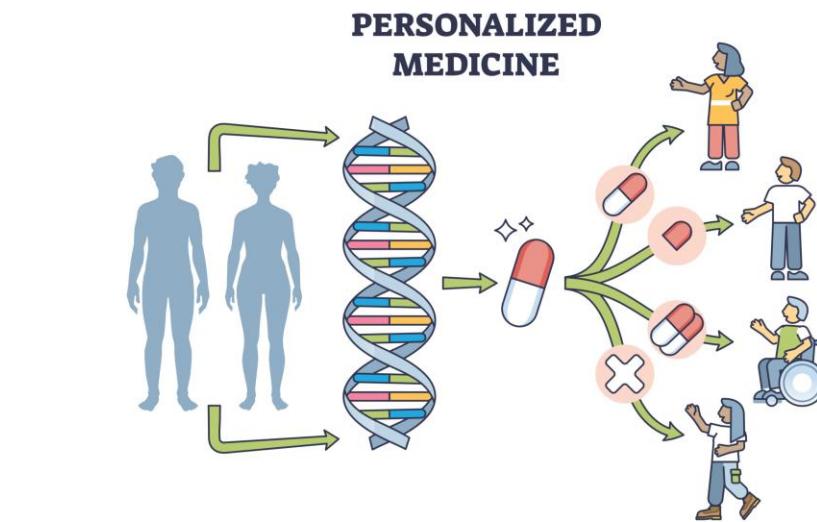
Applicazioni del Machine Learning



What can I help with?

Message ChatGPT

Create image Code Brainstorm Analyze data Surprise me More





2013-2017



Voglio fare Machine
Learning!

ETH zürich



2013-2017



Master's Programme in
Data Science
Settembre 2020

Settembre 2017

ETH zürich

Try to learn something about
everything and everything about
something

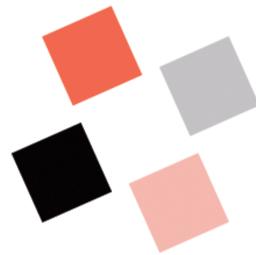
Try to learn something about
everything and everything about
something

Stato Whatsapp di un mio compagno di corso

ORIGINAL RESEARCH

Profiling Daily Life Performance Recovery in the Early Subacute Phase After Stroke Using a Graphical Modeling Approach

Janne M. Veerbeek , PhD*; Clemens Hutter , MSc*; Beatrice Ottiger, MSc; Soel Micheletti , MSc;
Simone Riedi , MSc; Enrico Bianchi , MSc; Noortje Maaijwee, MD; Tim Vanbellingen , PhD;
Thomas Nyffeler , MD



Swiss Study Foundation

ergon
**smart people –
smart software®**

SILICON VALLEY

TECH ME TO THE MOON



[Yellow Square] DENSELY POPULATED URBAN AREAS

[Purple Triangle] NASA AMES RESEARCH CENTER

[Purple Triangle] INTERNATIONAL AIRPORTS

[Red Square] LEADING UNIVERSITIES



Susan Athey

FOLLOW

The Economics of Technology Professor, [Stanford University](#) Graduate School of Business

Verified email at stanford.edu - [Homepage](#)

Market design econometrics auctions news media online advertising

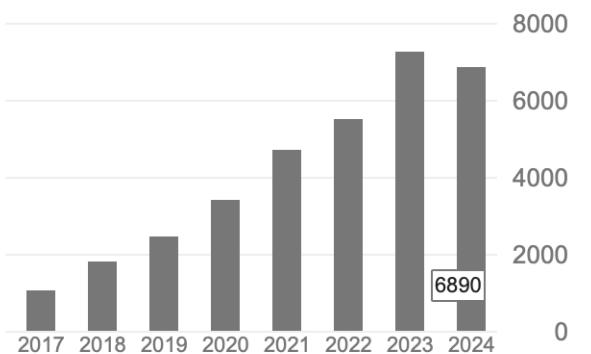
Cited by

[VIEW ALL](#)

All Since 2019

Citations	42589	31051
h-index	78	67
i10-index	133	122

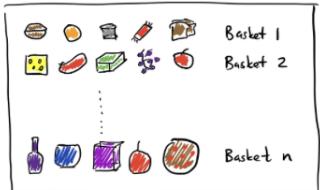
TITLE	CITED BY	YEAR
Estimation and inference of heterogeneous treatment effects using random forests S Wager, S Athey Journal of the American Statistical Association 113 (523), 1228-1242	3424	2018
When should you adjust standard errors for clustering? A Abadie, S Athey, GW Imbens, JM Wooldridge The Quarterly Journal of Economics 138 (1), 1-35	3264	2023
Recursive partitioning for heterogeneous causal effects S Athey, G Imbens Proceedings of the National Academy of Sciences 113 (27), 7353-7360	2317 *	2016



Dear Professor Athey,

my name is Soel Micheletti and I am a MSc. Student in Data Science at ETH Zurich (with minor in economics).

Last year I presented SHOPPER in the context of a seminar in advanced machine learning (see also <https://soel-micheletti.medium.com/shopper-a-probabilistic-model-of-consumer-choice-with-substitutes-and-complements-31d6fed79a81>), and I really enjoyed this line of research. I am currently looking for a Master thesis opportunity (for 6 months starting around October 2022), and if possible I would be truly delighted to join your research group to write my thesis.



SHOPPER: a Probabilistic Model of Consumer Choice with Substitutes and Complements | by Soel Micheletti | Medium

where, for each element of the dataset, y is a vector containing the purchased items, u is the ID of the customer, w is the week of the purchase and r is a vector with the prices of the items in the basket. The main goal of SHOPPER is modeling the available data to answer counterfactual queries, i.e. queries such as "What happens if I discount product X?". "What happens if I permanently ...

soelmicheletti.medium.com

I attach you my CV (see also <https://soelmicheletti.github.io/>) so you can see whether I can be a good fit. If you need any reference feel free to contact [REDACTED] he would also be available as the support professor from my home university.

[Soel Micheletti | Data Scientist](#)

My Personal Website.

soelmicheletti.github.io

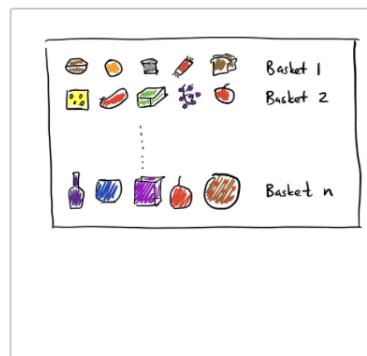
I am excited to hear back from you and of course I am available if you have any questions.

Best,
Soel

Dear Professor Athey,

my name is Soel Micheletti and I am a MSc. Student in Data Science at ETH Zurich (with minor in economics).

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SHOPPER: a Probabilistic Model of Consumer Choice with Substitutes and Complements

Soel Micheletti | Medium

where, for each element of the dataset, y is the indicator variable for whether the item was purchased, u is the ID of the customer who made the purchase, r is the vector with the prices of the items in the basket, and x is a vector with the features of the items. The main goal of SHOPPER is modeling the available information in the dataset to answer counterfactual queries, i.e. queries such as "What happens if I remove product X?", "What happens if I add product Y?", "What happens if I change the price of product Z?", etc.

soel-micheletti.medium.com

I attach you my CV (see also <https://soelmicheletti.github.io/>) so you can see what my research interests are and why I would be a good fit as the support professor from my home university.

He would also be available to act as a reference for me in the future.

Soel Micheletti | Data Scientist

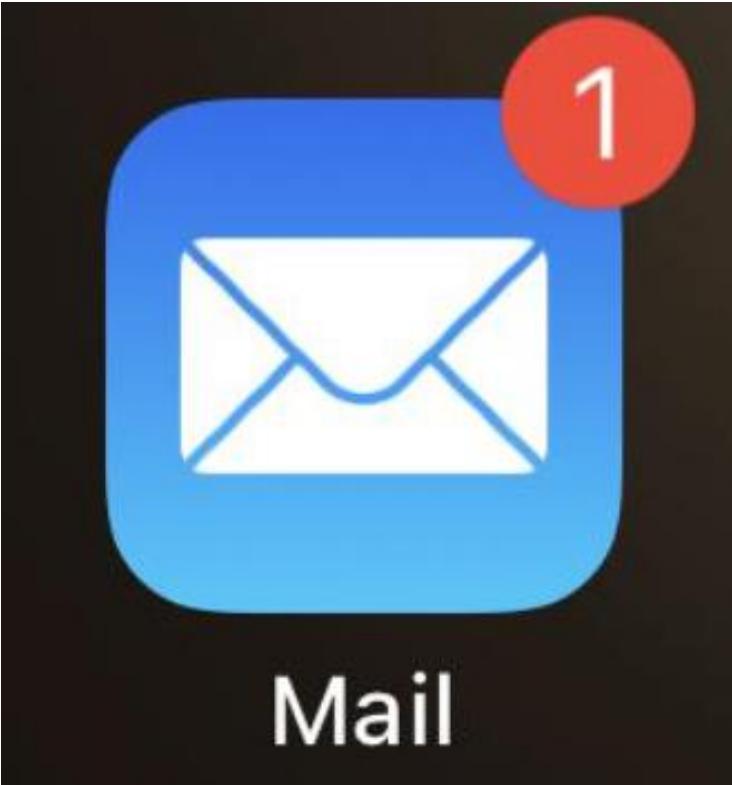
My Personal Website.

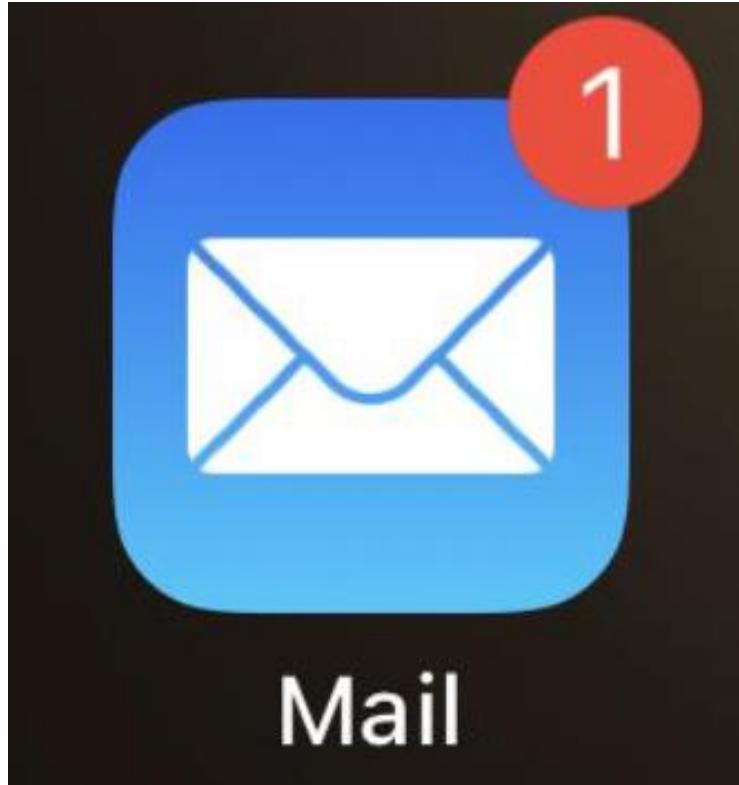
soelmicheletti.github.io

I am excited to hear back from you and of course I am available if you have any questions.

Best,
Soel

>	svigeant@broadinstitute.org; cuhler@mi...	✉	[ETH Zurich] Thesis	Dear Samantha, I attach you the E-Mail for a thesis opportunity that I se...
>	Yu Shancong; shancong.yu@inf.ethz.ch	✉	TA_Timesheet_March	Dear Song, Here is my timesheet for April. Thanks for a quick reply ...
	Soel Micheletti	(Nessun oggetto)	Dear Professor Schmidt,	My name is Soel and I am a MSc. Student in Dat...
>	Rui Henriques; rmch@tecnico.ulisboa.pt	✉	[ETH Student] Master Thesis	Thank you very much for the quick response Rui! Of course gr...
	AbdelghaniBenharref@uowdubai.ac.ae	✉	ETH Student: Master Thesis	Dear Professor Benharref, my name is Soel Micheletti and I am ...
[REDACTED]				
	sanmi@illinois.edu	✉	ETH Zurich Student	Dear Professor Koyejo, my name is Soel Micheletti and I am a MSc. Stu...
	hannaneh@cs.washington.edu	✉	ETH Zurich Student	Dear Professor Hajishirzi, my name is Soel Micheletti and I am a MSc. St...
	david.blei@columbia.edu	✉	ETH Zurich Student	Dear Professor Blei, my name is Soel Micheletti and I am a MSc. Studen...
[REDACTED]				
	ajratner@gmail.com	✉	ETH Zurich Student - Thesis	Dear Professor Ratner, my name is Soel Micheletti and I am a ...
	Chan Robin		AI Center Projects in ML	Dear Robin, Unfortunately the other guy in my team told me that ...
	Soel Micheletti	(Nessun oggetto)	Anteprima non disponibile.	
	ahaegele@ethz.ch		AI Project	Dear Alex, nice to meet you! My name is Soel and I'm in my second year of my M...
	athey@stanford.edu	✉	ETH Zurich Student	Dear Professor Athey, my name is Soel Micheletti and I am a MSc. Stud...
	chohsieh@cs.ucla.edu	✉	Master Thesis - ETH Zurich Student	Dear Professor Hsieh, my name is Soel Micheletti and I ...





Caro Soel,

Grazie per avermi scritto!

Purtroppo sto facendo un anno sabbatico
per dedicarmi alla mia startup, quindi non
accetto nuovi studenti.

In bocca al lupo

TENTATIVI

**ALMENO UNA
RISPOSTA**

OFFERTE

TENTATIVI

33

**ALMENO UNA
RISPOSTA**

7

OFFERTE

TENTATIVI

33

**ALMENO UNA
RISPOSTA**

7

OFFERTE

3



**HARVARD
T.H. CHAN**

SCHOOL OF PUBLIC HEALTH

John Quackenbush

Henry Pickering Walcott Professor of Computational Biology and Bioinformatics
Chair, Department of Biostatistics

June 29, 2022

Dear Mr. Micheletti,

Thank you so much for your interest in the Department of Biostatistics at the Harvard T.H. Chan School of Public Health. Professor John Quackenbush felt that you would be an asset to Modeling and Analysis of Gene Regulatory Networks in Cancer. Therefore, we are pleased to offer you an appointment as a Visiting Graduate Student at the Department of Biostatistics for the period 10/01/2022-3/31/2022. Please keep in mind that this offer is contingent upon your ability to obtain the proper visa. Once your visa has been obtained, and all of your appointment paperwork has been submitted and processed by the Office of Faculty Affairs, you will receive an official appointment letter from this office as well.



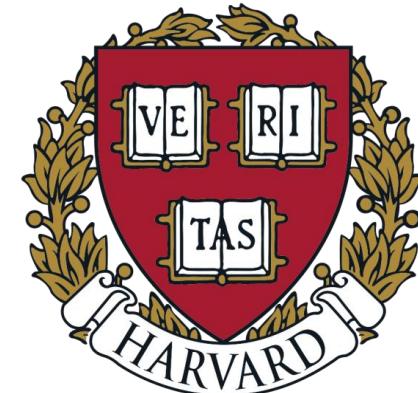
2013-2017



Master's Programme in Data Science

Settembre 2020

ETH zürich











1. Shred and mix

2. Dip and serve

3. Top with the dip

4. Serve with chips

5. Enjoy!

Hot Eat



CAPT. RED



GET THE NBA APP

#BLEED



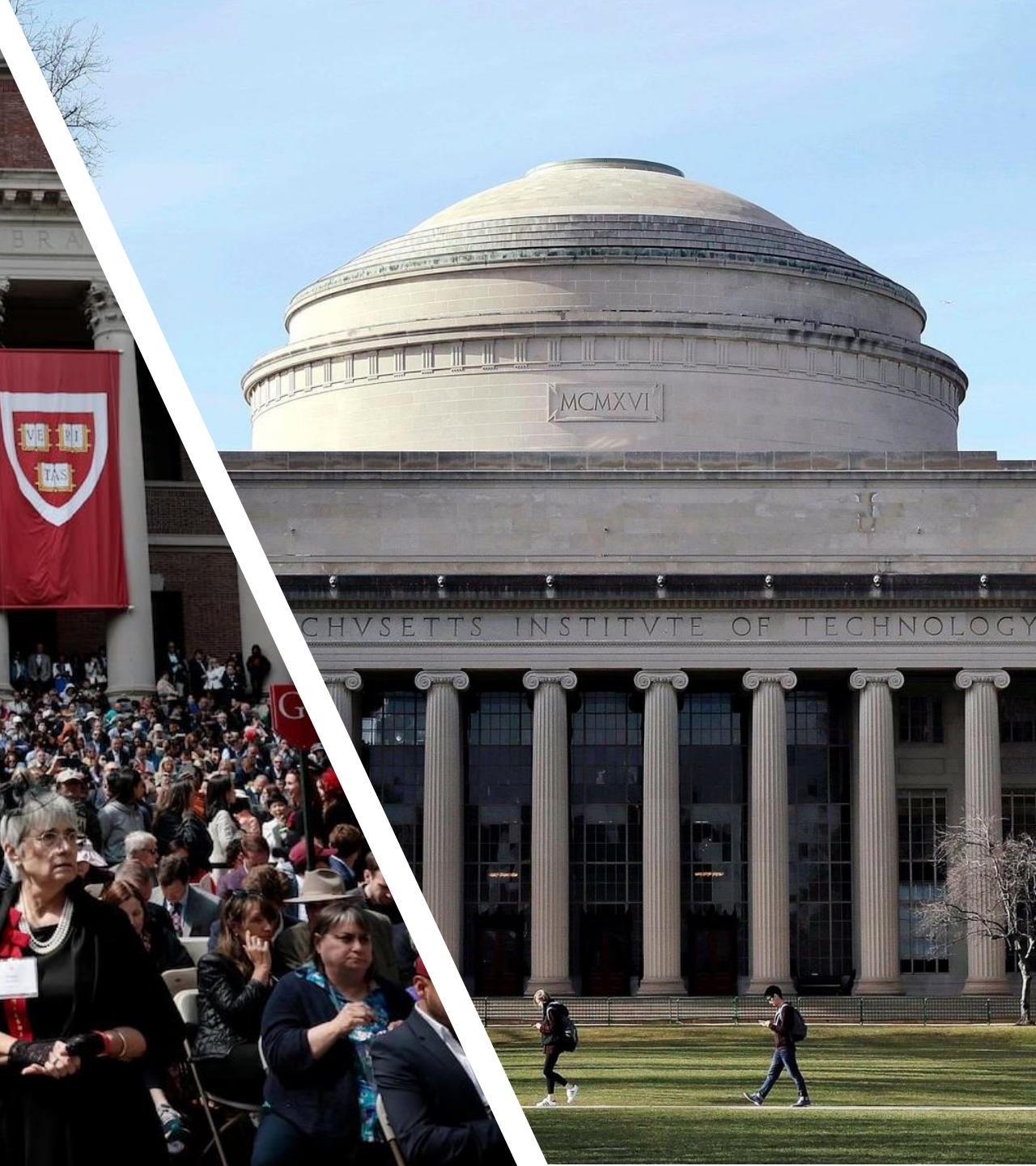
GET THE APP

coinbase

GET THE APP

51





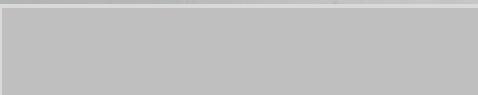




HARVARD
UNIVERSITY



SOEL MICHELETTI



Preserving relative densities in low-dimensional embeddings

Litinger talks - Department of Bioinformatics | 12/01/22









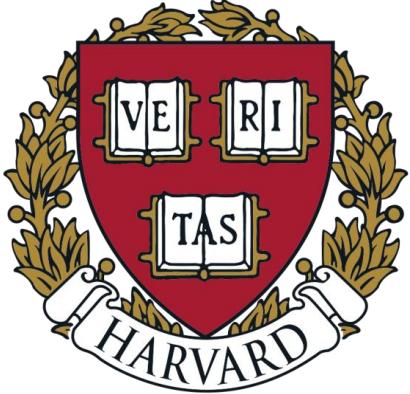


THE NETWORK ZOO

netZooR 105 netZooPy 78 netZooM 26 netZooC 26 Netbooks 39

netZoo{R,Py,M,C} is a menagerie of network biology methods. Implementation details and use cases in

The Network Zoo: a multilingual package for the inference and analysis of gene regulatory networks. Ben Guebila et al, 2023. *Genome Biology*. doi:[10.1186/s13059-023-02877-1](https://doi.org/10.1186/s13059-023-02877-1)



Cromosomi

Geni

Metilazione del DNA

...

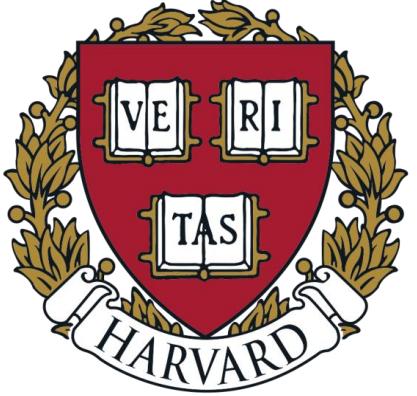


Algoritmi

Machine Learning

Programmazione

...



Cromosomi

Geni

Metilazione del DNA

...

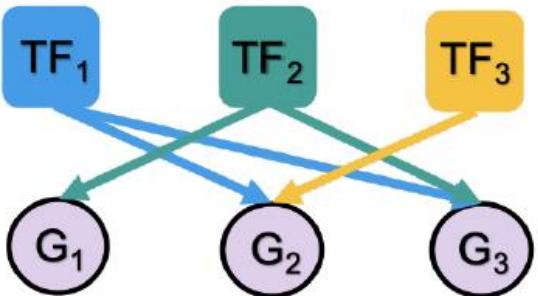
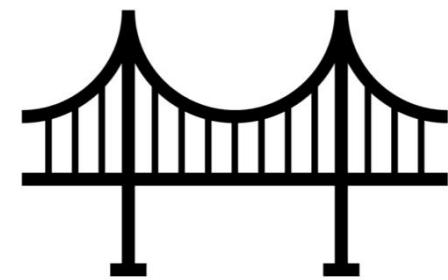
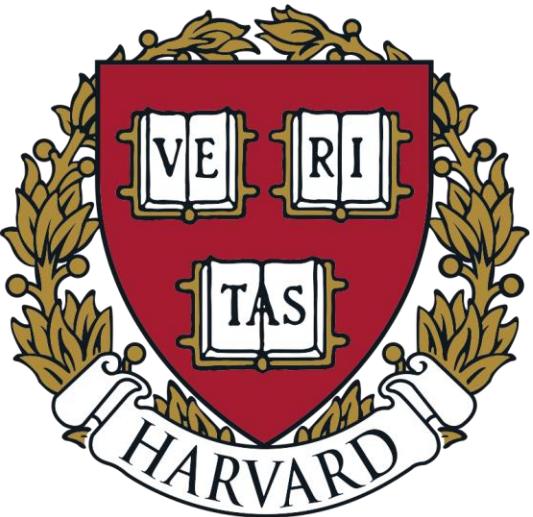


Algoritmi

Machine Learning

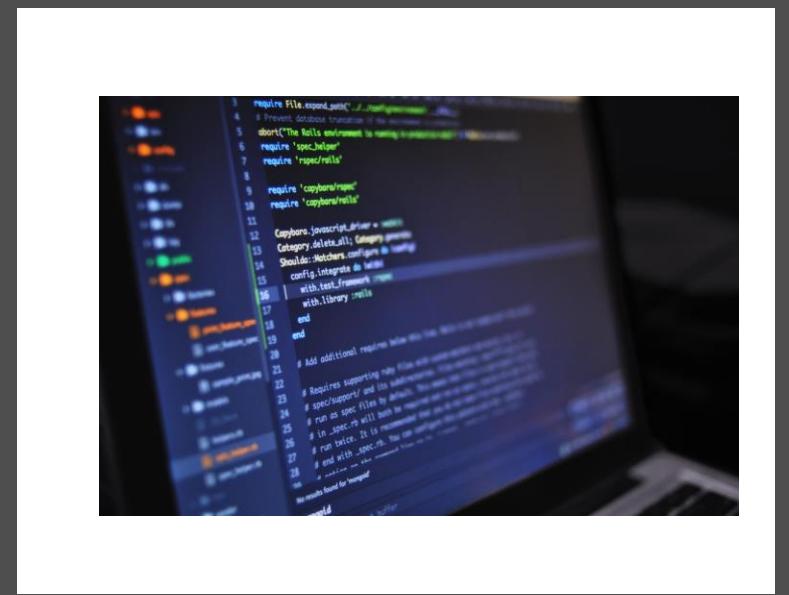
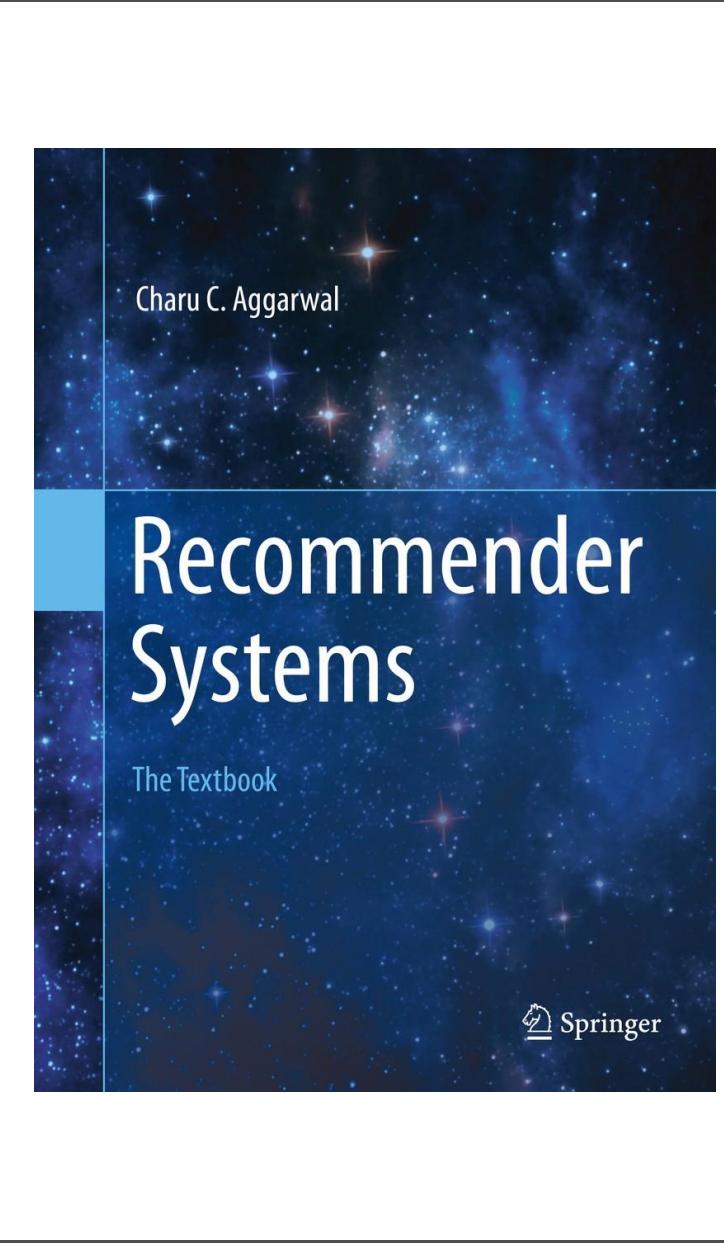
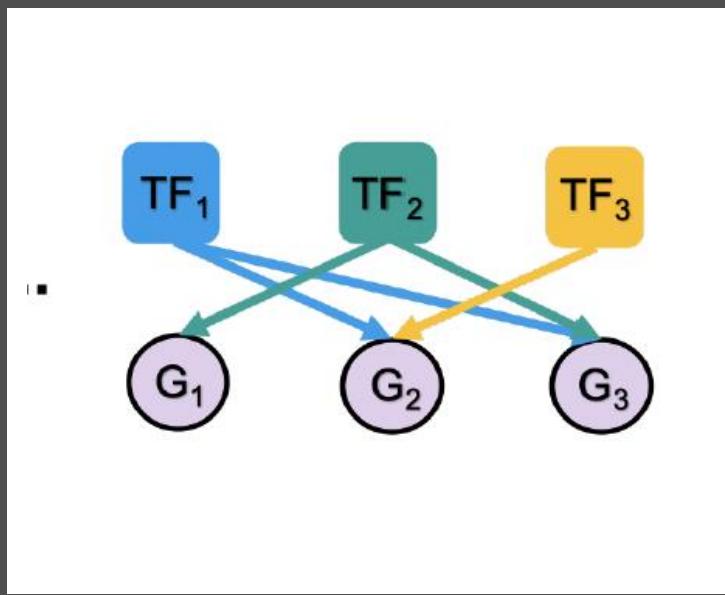
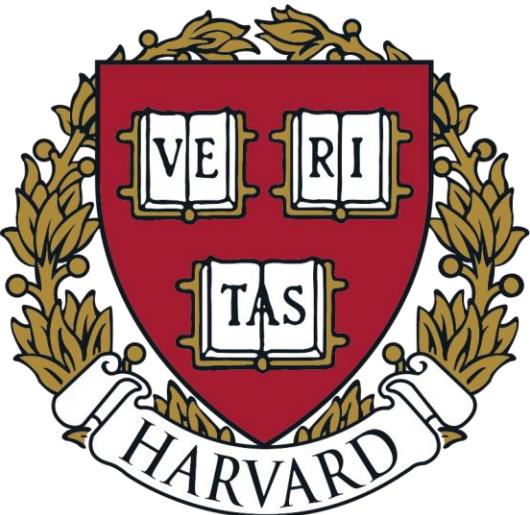
Programmazione

...

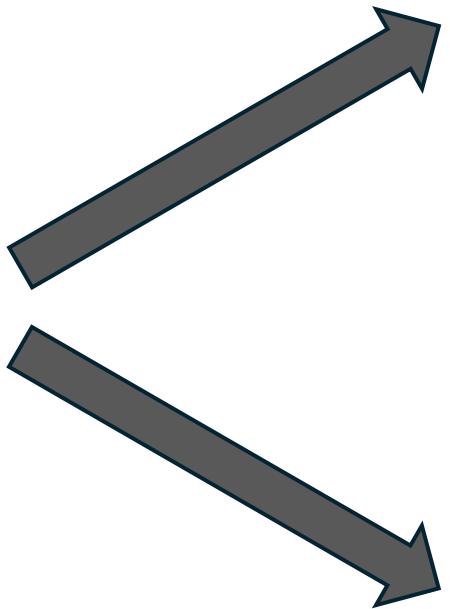


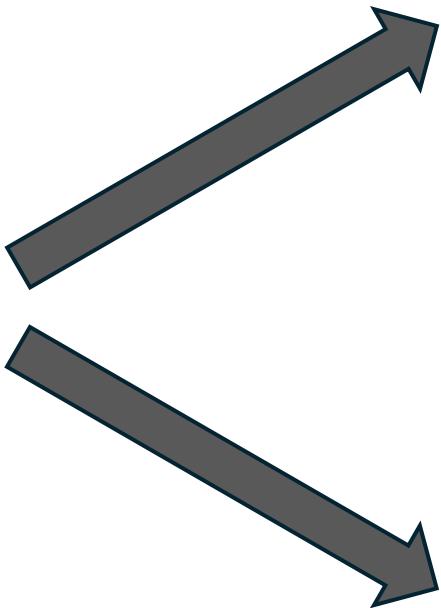
```
3 require 'file.exposed_path' # Prevent database truncation of the environment
4 abort! 'The Rails environment is running in production mode'
5 require 'spec_helper'
6 require 'spec/rails'
7
8 require 'capybara/rspec'
9 require 'capybara-selenium'
10
11 Capybara.javascript_driver = :selenium
12 Category.delete_all Category.create!(name: "Category 1")
13 Category.create!(name: "Category 2")
14 ShouldMatchers.configure do |config|
15   config.integrate_with :rspec
16   config.integrate_with :rspec_rails
17   config.integrate_with :rspec_database_cleaner
18   config.integrate_with :rspec_selenium
19 end
20
21 # Add additional requires below this line if needed
22
23 # Requires supporting files within the same directory as this file or,
24 # if further up the tree, look for a supporting file from a matching file name
25 # in an ancestor directory
26
27 # Run this command with `rspec` to run all the examples in files that have
28 # `spec` in their name
29
30 # Run `rspec spec` to run all examples, preceded by `rspec` if you
31 # want to leave that part out, or `rspec ./spec` to run a subset of
32 # examples
33
34 # For more detailed help and documentation, please refer to the RSpec
35 # Guide. To install it, type `bundle add rspec/guide` or
36 # `gem install rspec-guide`.
```



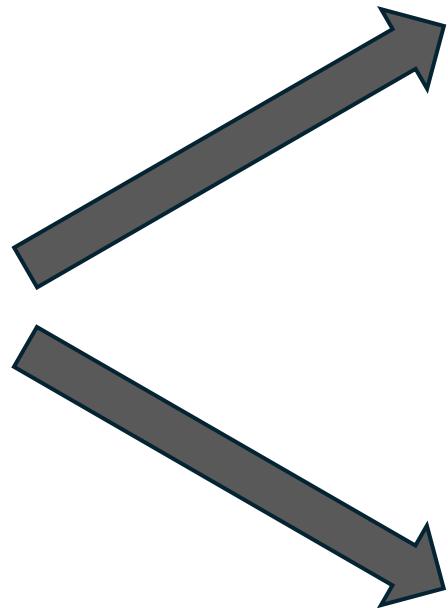








Content-based filtering



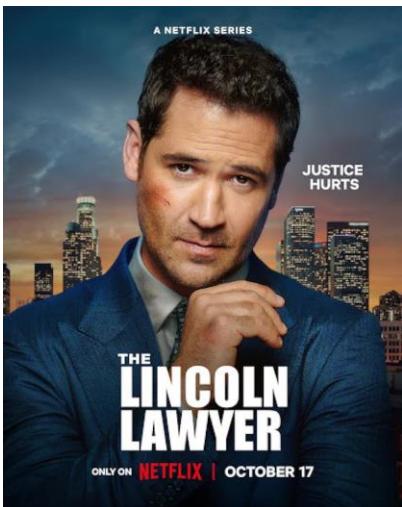
Alice



Bob



Carol



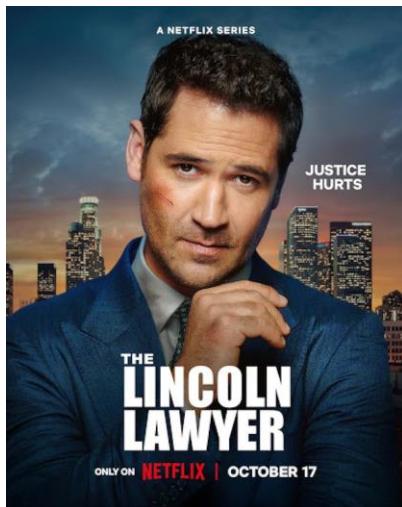
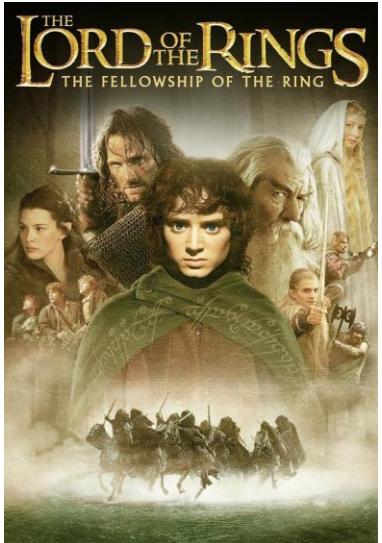
Alice



Bob



Carol



Collaborative filtering

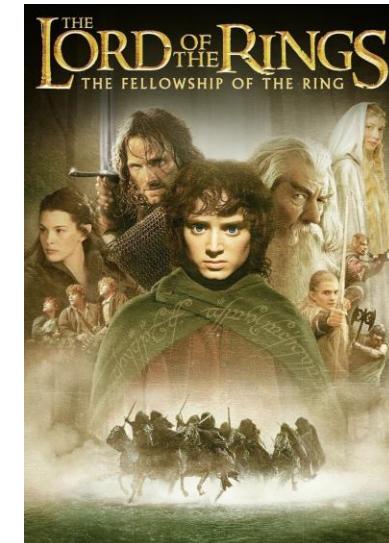
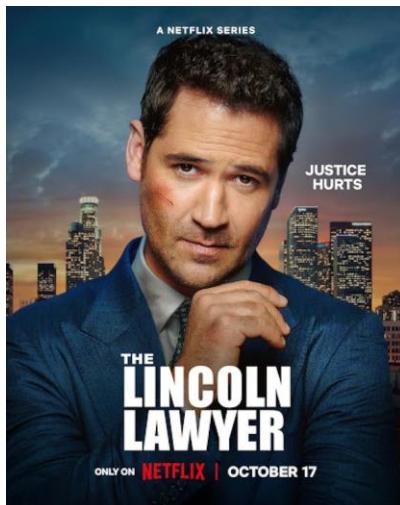
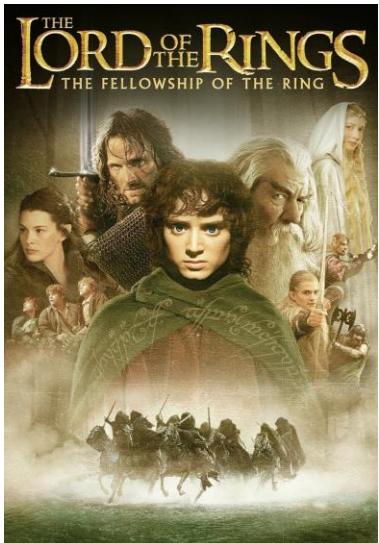
Alice



Bob



Carol



Content-based filtering



Collaborative filtering

Alice

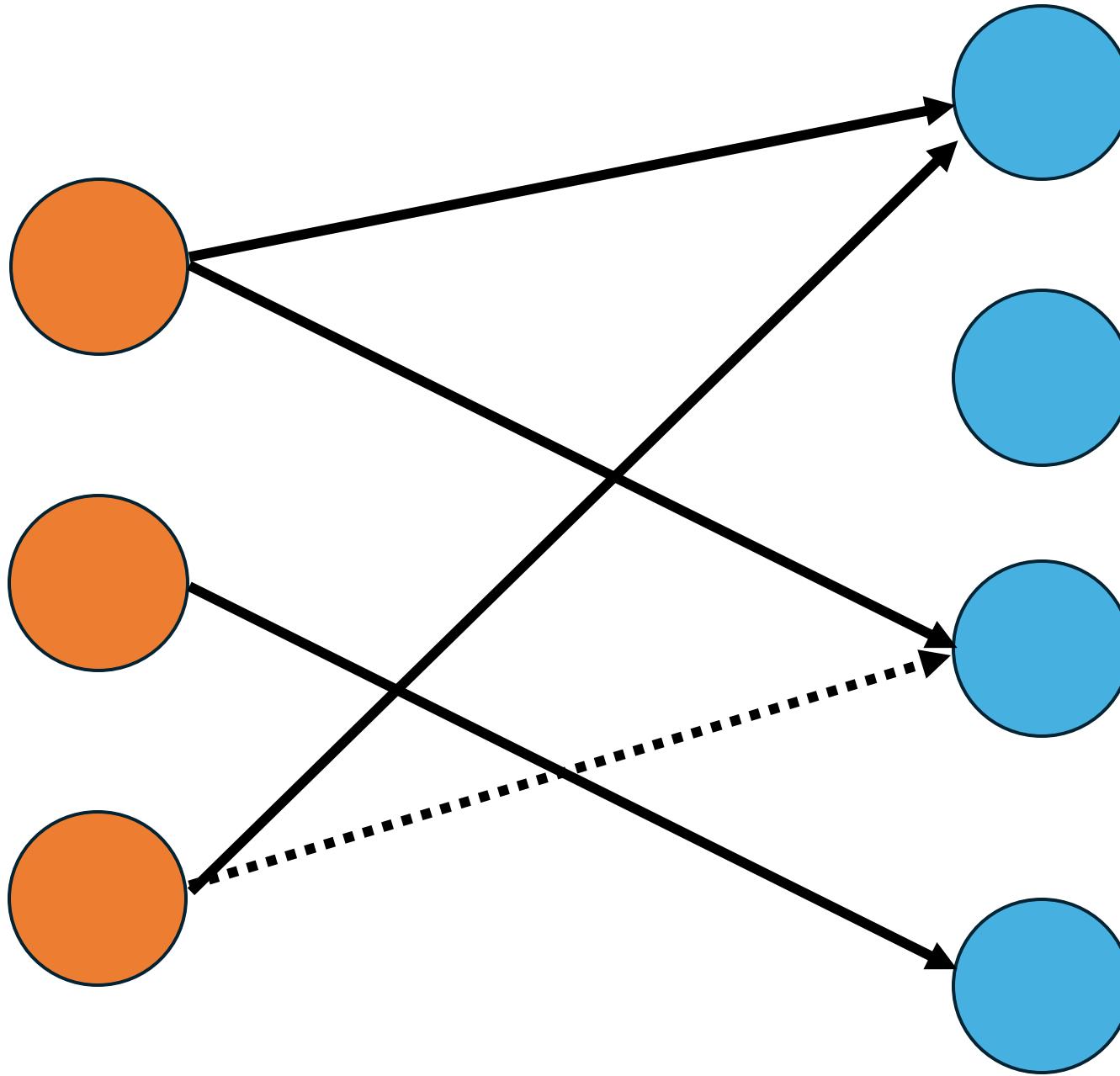


Bob



Carol



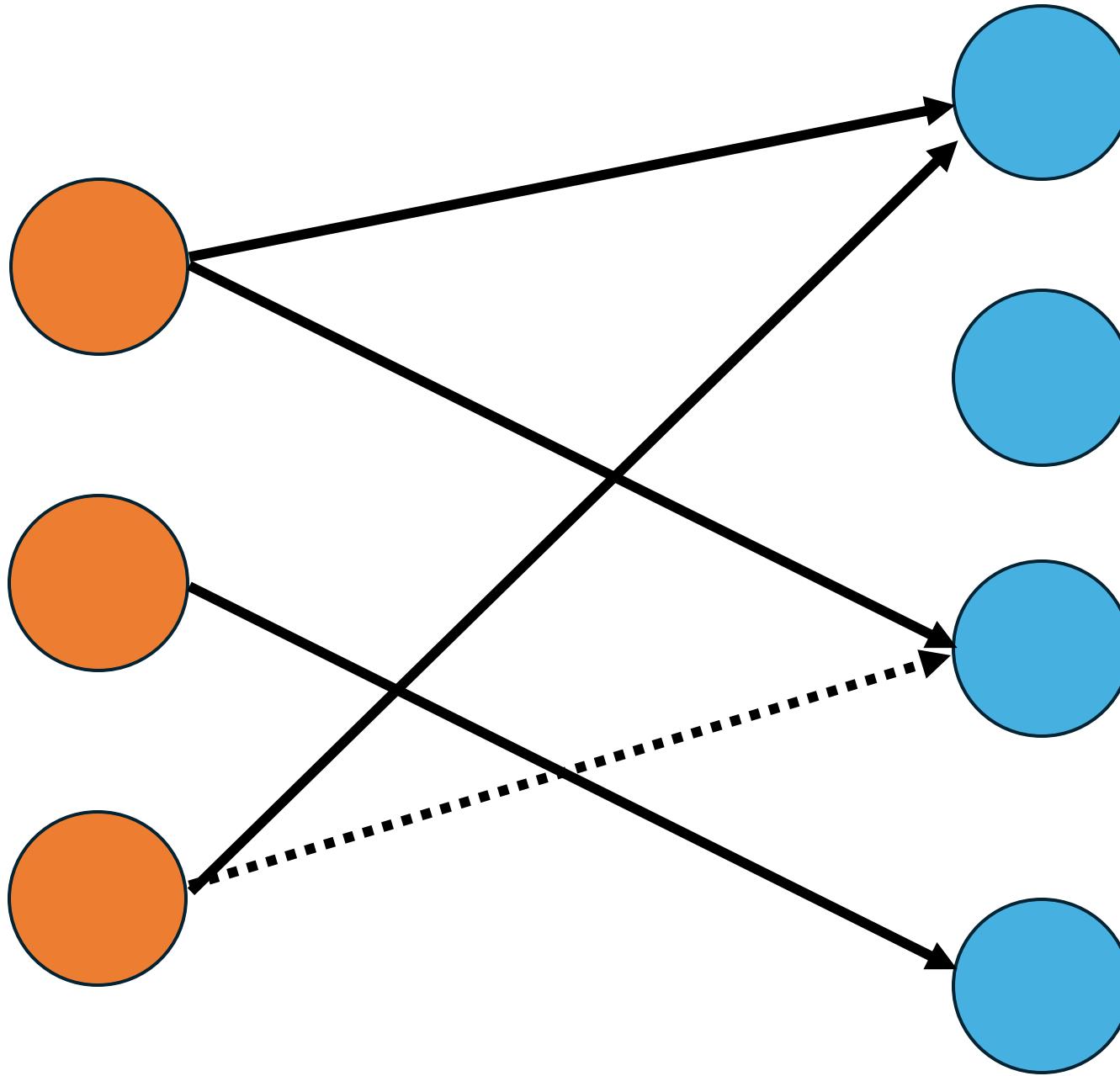


● Utenti

● Articoli

→ Interazioni

....→ Predizioni



○ Proteine

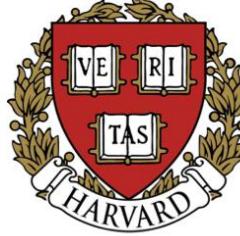
○ Geni

→ Interazioni

....→ Predizioni



Eidgenössische Technische Hochschule Zürich
Swiss Federal Institute of Technology Zurich



Biologically informed matrix factorization for joint inference of gene regulatory networks and transcription factor activities

Master's Thesis

Soel Micheletti

21st April 2023

Supervisor: Prof. Dr. J. Vogt

External supervisor: Prof. Dr. J. Quackenbush

Advisors: Dr. A. Marx, Dr. P. Mandros, Dr. J. Fischer

Department of Biostatistics, Harvard T.H. Chan School of Public Health

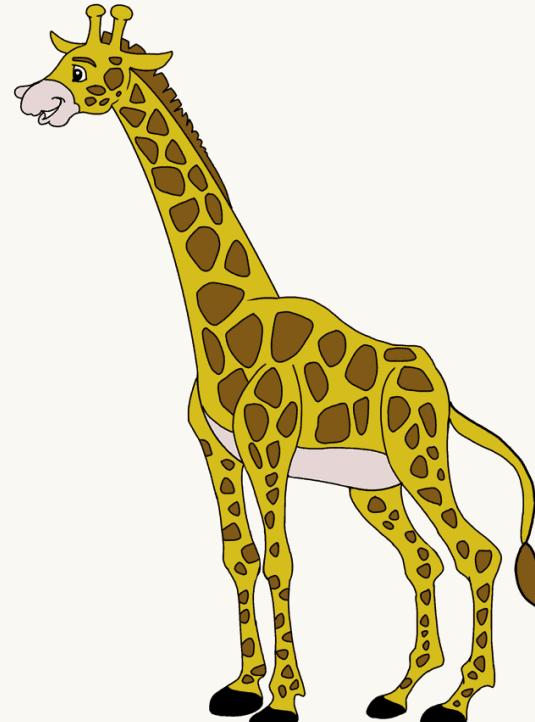
Department of Computer Science, ETH Zürich



Eidgenössische Technische Hochschule Zürich
Swiss Federal Institute of Technology Zurich



**Biology
factorization
gene expression
transcriptomics**



**rix
ce of
ind
ies**

Supervisor: Prof. Dr. J. Vogt

External supervisor: Prof. Dr. J. Quackenbush

Advisors: Dr. A. Marx, Dr. P. Mandros, Dr. J. Fischer

Department of Biostatistics, Harvard T.H. Chan School of Public Health

Department of Computer Science, ETH Zürich



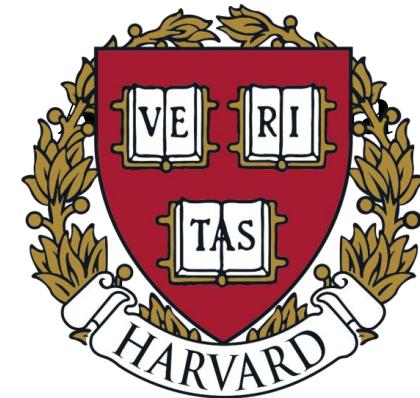




Accademia

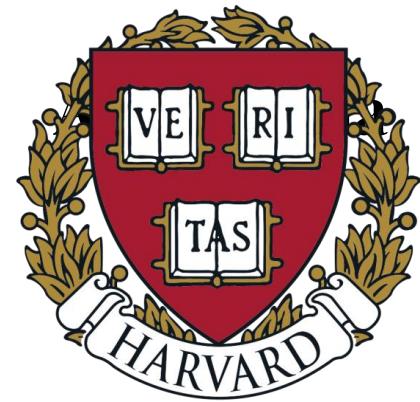
Industria

Start-up

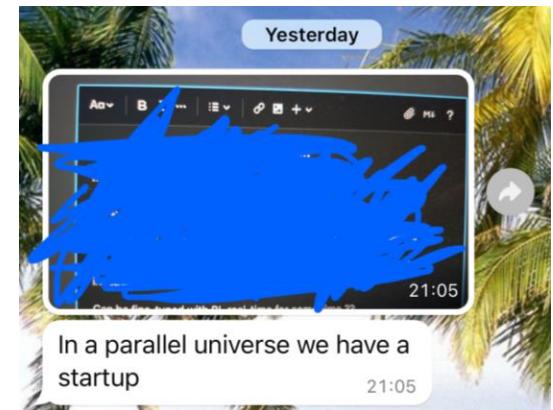
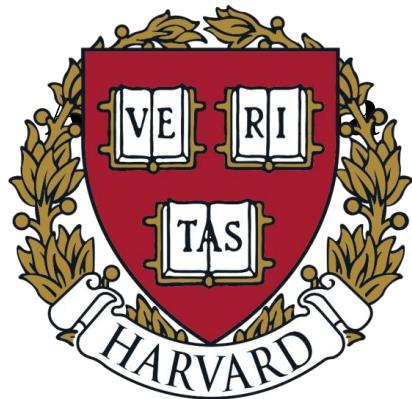


Industria

Start-up



Start-up



Try to learn something about
everything and everything about
something

FEEDATEVI DI ME

- Mr Rip: https://www.youtube.com/@mr_rip
- Baxate Carter: https://www.instagram.com/baxate_carter/?hl=en
- Intervista ad Ale Gnoli (manager in Google): <https://www.youtube.com/watch?v=cVoAmzofZaU>
- Intervista a John Quackenbush (mio professore ad Harvard): https://www.youtube.com/watch?v=NNfCaBEF_Sc&t=1347s
- Video di Marcello Ascani sull'ETH: <https://www.youtube.com/watch?v=Rg4BwAZbylQ&t=208s>
- Alberto Alfarano (grande esempio): <https://www.youtube.com/watch?v=RtDmH6mfFv8&t=3081s>

FAQ

- Mi piacciono i videogiochi, dovrei studiare informatica?
- Quale linguaggio di programmazione consiglieresti ad un principiante?
- L'intelligenza artificiale rimpiazzerà gli ingegneri informatici?

MAGARI PUÒ INTERESSARTIANCHE....

- Ma raccontaci un po' di più del tuo periodo liceale...
- Tornando indietro faresti qualcosa in modo diverso?
- Hai parlato di sistemi di raccomandazione, ci consigli qualche canale YouTube/ film/ libro?
- Cosa faresti se iniziassi a studiare informatica nel 2024?
- Ma quel viaggio in India?

Thank You!

FEEDATEVI DI ME

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- Baxate Carter: https://www.instagram.com/baxate_carter/?hl=en
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Systems biology

Higher-order correction of persistent batch effects in correlation networks

Soel Micheletti  ^{1,†}, Daniel Schlauch  ^{1,2,3,†}, John Quackenbush  ^{1,2,4,‡,*},
Marouen Ben Guebila  ^{1,‡}

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Eidgenössische Technische Hochschule Zürich
Swiss Federal Institute of Technology Zurich

Impact of Duplicate Avoidance for the $(2 + 1)$ -EA on Monotone Functions

Bachelor Thesis

S. Micheletti

16th July 2020

Dear Soel,

I am glad that you enjoyed the work! I have discussed the thesis with [REDACTED] and we will give you a 5.5 for the thesis.

You did struggle quite a lot with the subject, and a lot of the information flow during our meetings went from me to you. But this was also because it was a very complex problem. Still, most ideas in the thesis came from me in the end, and that is why it is not a 6.

However, it is not a bad result, far from it. The topic was a very challenging one, and you fought through it. It was hard, but in the end you understood all the ideas and proofs and got a nice result for the (2+1)-EA. You also got quicker to get through things in the last weeks. And the thesis has gotten really good after all.

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