Personalized Machine Learning

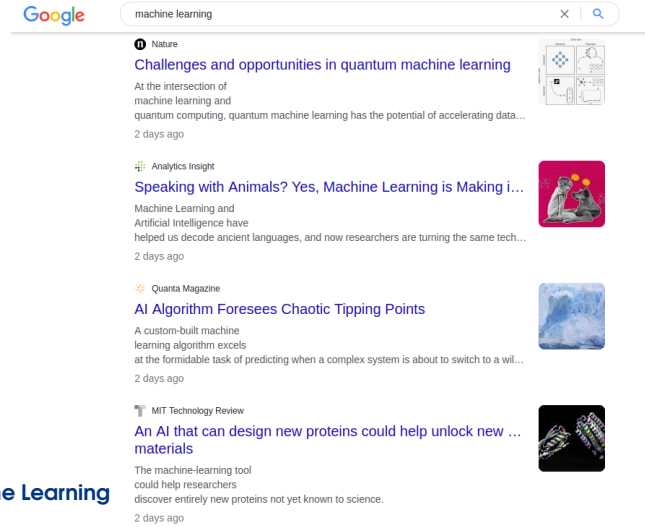
Intro & Organisation

Rodrigo Alves

October 02, 2025

What is Machine Learning?

Machine Learning News



Machine Learning is Everywhere

One can find very funny applications:

1. Harry Potter and the Portrait that Looked Like a Large Pile of Ash.
2. Generate photos of new people.
3. Impressive 94% on the prediction of the Academy Awards Winners.
4. Making a robot that makes you laugh.

What is Machine Learning?

"Machine learning is an application of AI that enables systems to learn and improve from experience **without being explicitly** programmed."

— Arthur Samuel, AI pioneer

"A computer programme is said to learn from experience E with respect to some class of tasks T and performance measure P, if its performance at tasks in T, as measured by P, improves with experience E."

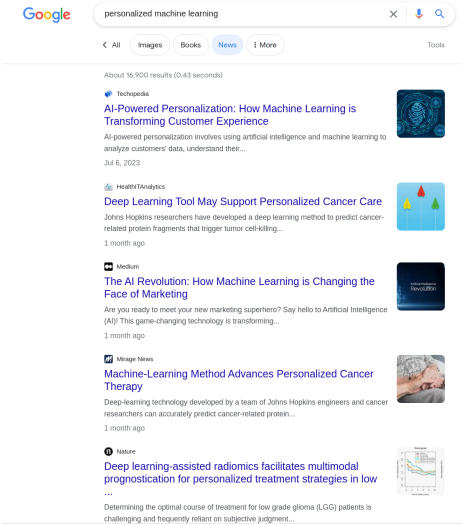
— Tom Mitchell, CMU

"Machine learning (ML) is a field of enquiry devoted to understanding and building methods that 'learn', that is, methods that **leverage data** to improve performance on some set of tasks."

— Wikipedia

What is Personalized Machine Learning?

PML News


Google
personalized machine learning
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Images
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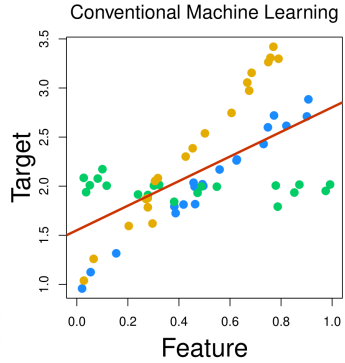
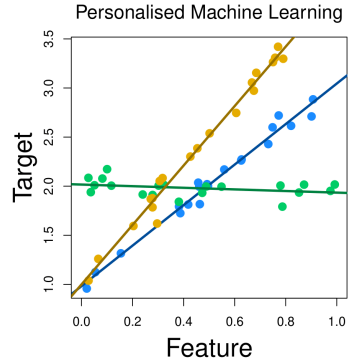
Tools
About 16,900 results (0.43 seconds)
Techopedia
AI-Powered Personalization: How Machine Learning is Transforming Customer Experience
AI-powered personalization involves using artificial intelligence and machine learning to analyze customers' data, understand their...
Jul 6, 2023
HealthITAnalytics
Deep Learning Tool May Support Personalized Cancer Care
Johns Hopkins researchers have developed a deep learning method to predict cancer-related protein fragments that trigger tumor cell-killing...
1 month ago
Medium
The AI Revolution: How Machine Learning is Changing the Face of Marketing
Are you ready to meet your new marketing superhero? Say hello to Artificial Intelligence (AI)! This game-changing technology is transforming...
1 month ago
Mirage News
Machine-Learning Method Advances Personalized Cancer Therapy
Deep-learning technology developed by a team of Johns Hopkins engineers and cancer researchers can accurately predict cancer-related protein...
1 month ago
Nature
Deep learning-assisted radiomics facilitates multimodal prognostication for personalized treatment strategies in low ...
Determining the optimal course of treatment for low grade glioma (LGG) patients is challenging and frequently reliant on subjective judgment...

ML × PML


Conventional Machine Learning
Target
Feature
1.0
1.5
2.0
2.5
3.0
3.5
0.0
0.2
0.4
0.6
0.8
1.0


Personalised Machine Learning
Target
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1.0
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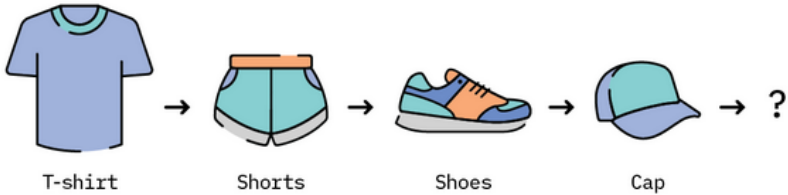
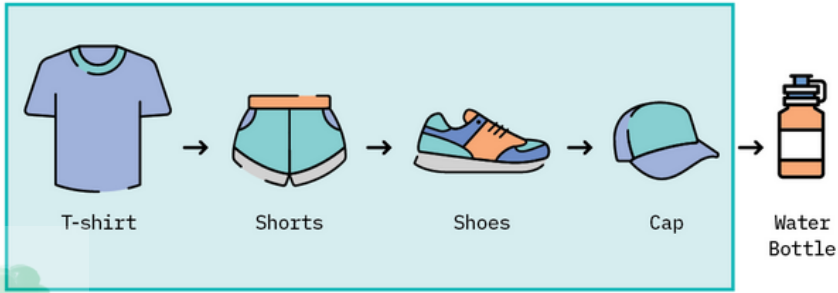
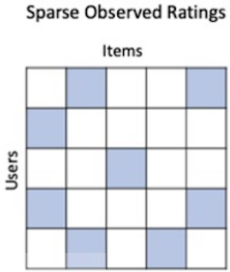
A Gentle Example...



A Gentle Example...



...and a Possible Modelling.



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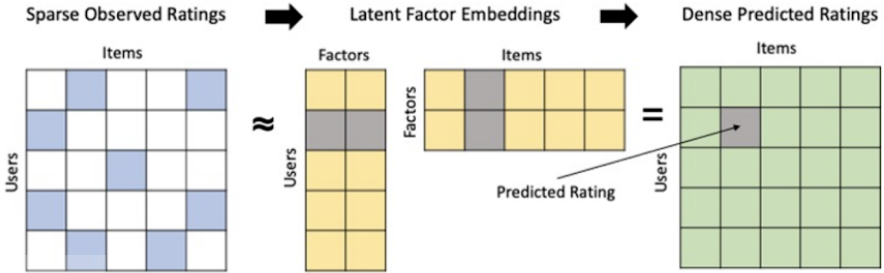

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What Personalized Machine Learning is About?

Application
Recommender Systems

Optimisation
Mathematics and Algorithms

Model
Matrix Factorization

Theory
Theoretical Guarantees

Assessment

- Courses.fit
- To write the Exam you need to get minimum of 35 points (maximum is 70 points).
- **Tutorial Homework (Maximum 10 points):** There will be a total of four homework assignments distributed throughout the semester. Each assignment carries a maximum score of 5 points.
- **Semester Project (Maximum 70 points):** The semester project is an individual undertaking.

It is not an easy course! Therefore, you need to learn properly. PML is multidisciplinary and performing the activities is crucial to the learning path.

Exam

- The exam will be oral.
- Maximum 30 points (To be approved, you need to get at least 15 points on the final exam)
- You will receive two topics for discussion:
  1. a question related to your semester project (Max. 10 points);
  2. a topic based on the content covered in lectures and tutorials (Max. 20 points).
- You will have 20 minutes for preparation before the oral exam begins. The oral exam itself will follow the preparation period.

Certainly, the course material is sufficient for **studying** for and being **approved** on the exam. However, do not expect memorisable questions. For example, if the lecture covers the derivative of $f(x) = x^3$, it is reasonable that the exam could cover the derivative of $g(x) = 4x^2$. In machine learning terms, you will only have access to the **training** and **validation** sets, but not for the **test** set.

Learning Materials

- Our course is basic with many other materials available.
- Lecture and tutorial materials are all you need to finish this course.
- Mathematics for Machine Learning is an excellent basis book.
- The book Personalized Machine Learning is a new one on the subject.
- Documentation of python library scikit-learn is also good resource.
- Courses.fit

Background

- The python (or other ML language) skills is a must.
- It is assumed you know basics of ML, probability and statistics.
- It's an advantage if you have already heard of some of the techniques.
- Knowledge of Linear Algebra (most of the methods works with matrices) and Analysis (Machine Learning = Optimisation $\simeq$ Gradient Descent).

Typical Week

- Materials will be found on courses.fit
- **Lectures:** Thu 16:15-17:45 **(Room: JP:B-570)**
- **Tutorials:** Thu 18:00-19:30 **(Room: JP:B-570)**

If you could bring a laptop would be beneficial for the learning goals (both lecture and tutorials).

Communication

- Rodrigo Augusto da Silva Alves
- rodrigo.alves@fit.cvut.cz
- Room: TH:A-1354 **(Please, make an appointment before)**
- Materials will be updated in the website

If you are about to start your master thesis I would be happy to mentoring your research in some of my projects or if you have a good idea in my research area.

Obrigado :) - Faculty of Information Technology