

# IB031: Úvod do strojového učení

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his boys

Kdo s kým, o čem, proč

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ISMU

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Příklad 1: lineární model - predikce

# Kdo s kým, o čem, proč

Příklad 2: nelineární model - detekce spamů

# Organizace

- ▶ přednášky
- ▶ cvičení 2h
- ▶ projekt
- ▶ semestrální zkouška
- ▶ písemná zkouška

## Závěrečné hodnocení

- ▶ semestrální zkouška 25b.
- ▶ projekt 30b. (min 15b.)
- ▶ závěrečná zkouška 45b. (min 15b.)
- ▶ <50 F, <60 E, <70 D, <80 C, <90 B, >=90 A  
40 zápočet

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Herbert Simon (1960s): “Learning is any process by which a system improves performance from experience.”

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# Příklady

T: Playing checkers

P: Percentage of games won against an arbitrary opponent

E: Playing practice games against itself

T: Recognizing hand-written words

P: Percentage of words correctly classified

E: Database of human-labeled images of handwritten words

T: Driving on four-lane highways using vision sensors

P: Average distance traveled before a human-judged error

E: A sequence of images and steering commands recorded while observing a human driver.

T: Categorize email messages as spam or legitimate.

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Další příklady?

# Třídy úloh

- ▶ shlukování
- ▶ klasifikace a predikce
- ▶ hledání asociací
- ▶ detekce anomálií

# Historie

- ▶ 1950s :  
Alan Turing and NP-hard problems  
Samuel's checker player, see Ray Mooney ML Course slides
- ▶ 1960s :  
Neural networks: Perceptron  
Pattern recognition  
Learning in the limit theory  
Minsky and Papert prove limitations of Perceptron
- ▶ 1970s :  
Symbolic concept induction  
Winston's arch learner  
Expert systems and the knowledge acquisition bottleneck;  
Scientific discovery with BACON and AM (math)  
Quinlan's ID3  
Michalski's AQ



# Historie

- ▶ 1980s :
  - Advanced decision tree and rule learning
  - Learning and planning and problem solving
  - Resurgence of neural networks (connectionism, backpropagation)
  - Valiant's PAC Learning Theory
  - Focus on experimental methodology
- ▶ 1990s :
  - Data mining
  - Text learning
  - Reinforcement learning (RL)
  - Inductive Logic Programming (ILP)
  - Ensembles: Bagging, Boosting, and Stacking
  - Bayes Net learning
  - Web mining
  - Weka

# Historie

- ▶ 2000s :
  - Support vector machines. Kernel methods
  - Statistical relational learning
  - Graph and Sequence mining, Link learning
  - Privacy-preserving data mining
  - Security (intrusion, virus, and worm detection)
  - Recommender systems; Personalized assistants that learn
  - Visual data mining
  - Stream mining
  - RapidMiner
  - R for machine learning
- ▶ 2010s :
  - KNIME
  - Big data, Big data, Big data . .
  - Outlier detection and explanation
  - . . .