#### Welcome to CSC411



Y. Nikulin and R. Novak, Exploring the Neural Algorithm of Artistic Style

CSC411: Machine Learning and Data Mining, Winter 2017

## Machine Learning

- Tasks which are hard to solve programmatically:
  - Recognizing faces
  - Recommending movies based on a person's ratings
  - Deciding which web pages are relevant to a given Google search query

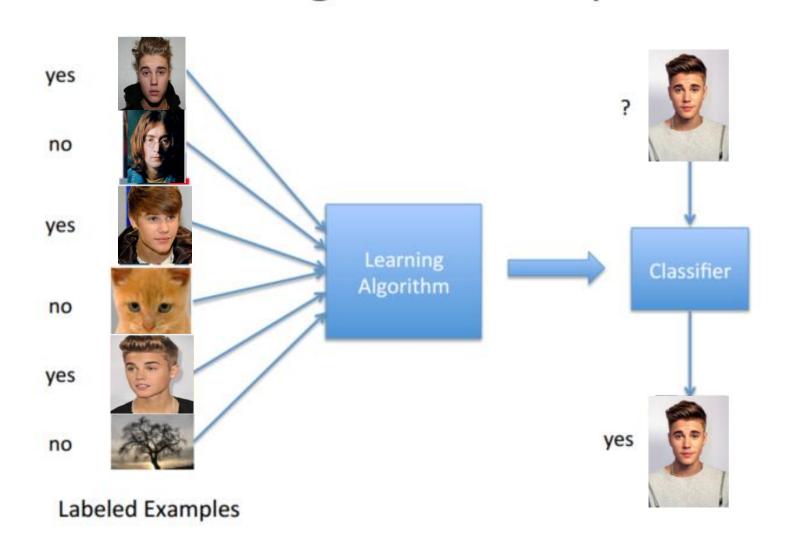
### A simple task: Recognizing Justin Bieber



# To a computer, this is what Justin Bieber looks like

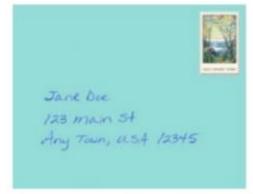
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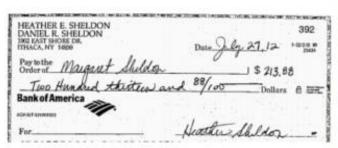
#### Machine Learning: Learn From Examples



## Machine Learning Applications













# Neural Network Applications



ML watches YouTube for three straight days! (and learns to recognize cats)

http://www.npr.org/2012/06/26/155792609/a-massive-google-network-learns-to-identify

**Building High-level Features Using Large Scale Unsupervised Learning** 

Quoc V. Le, Marc'Aurelio Ranzato, Rajat Monga, Mathieu Devin, Kai Chen, Greg S. Corrado, Jeffrey Dean, and Andrew Y. Ng

#### Course Goals

- Learn the basic building blocks and the general principles of designing machine learning algorithms
  - Understand the mathematical ideas needed for understanding and designing machine learning/neural networks algorithms
- Learn basic machine learning algorithms
- Learn the methodology of applying machine learning algorithms to data and evaluate their performance
- Apply the principles of machine learning in the context of neural networks and (probably) reinforcement learning

## Required math background

- Calculus: derivatives, derivatives as the slope of the function; integrals (a little bit)
- Probability: random variables, expectation, independence
- Linear Algebra: vectors: the dot product, vector norm, vector addition; matrices: matrix multiplication. (Probably: eigenvectors)
- Other topics may be needed, but will be covered in class
- It really helps to like and be comfortable with math: you probably won't enjoy this class if you dislike math

#### Administrative details

- Marking scheme to be finalized and posted within the next few days
- Tentative marking scheme
  - 4 projects worth about 35%
    - First one to be done individually, others probably can be done in teams of two
  - A midterm worth about 25%
    - Scheduled for Friday March 3 4pm-6pm (alternate timeslots available in case of documented conflicts)
  - An exam worth about 40%
    - Must receive at least 40% on the exam (after adjustment) to pass the course