9.520/6.860: Statistical Learning Theory and Applications

- Class: Tue, **Thu 11:00 - 12:30 pm**, 46-3002 (Singleton)

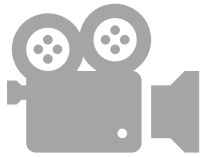
Office Hours: Friday 1:00 pm - 2:00 pm, 46-5156 (Poggio lab lounge)
and/or 46-5165 (MIBR Reading Room)

- Web: http://www.mit.edu/~9.520/
- Contact: 9.520@mit.edu
- Mailing ~~list: 9.520students@mit.edu (?)~~
- Live Stream: CBMM Youtube channel

- 9.520/6.860 will use Stellar
- Also check web (announcements) for updates

Material

Slides— will be posted (for most lectures) on the website



Videos— check CBMM

Notes—

L. Rosasco and T. Poggio, **Machine Learning: a Regularization Approach, MIT-9.520 Lectures Notes**, Manuscript, **(will be provided)**

For feedback on book (typos, errors, ...)
https://goo.gl/forms/pQcewnsAV3lCNoyr1

Faces

- Instructors:

Faces

- Instructors:
  - Lorenzo Rosasco

Faces

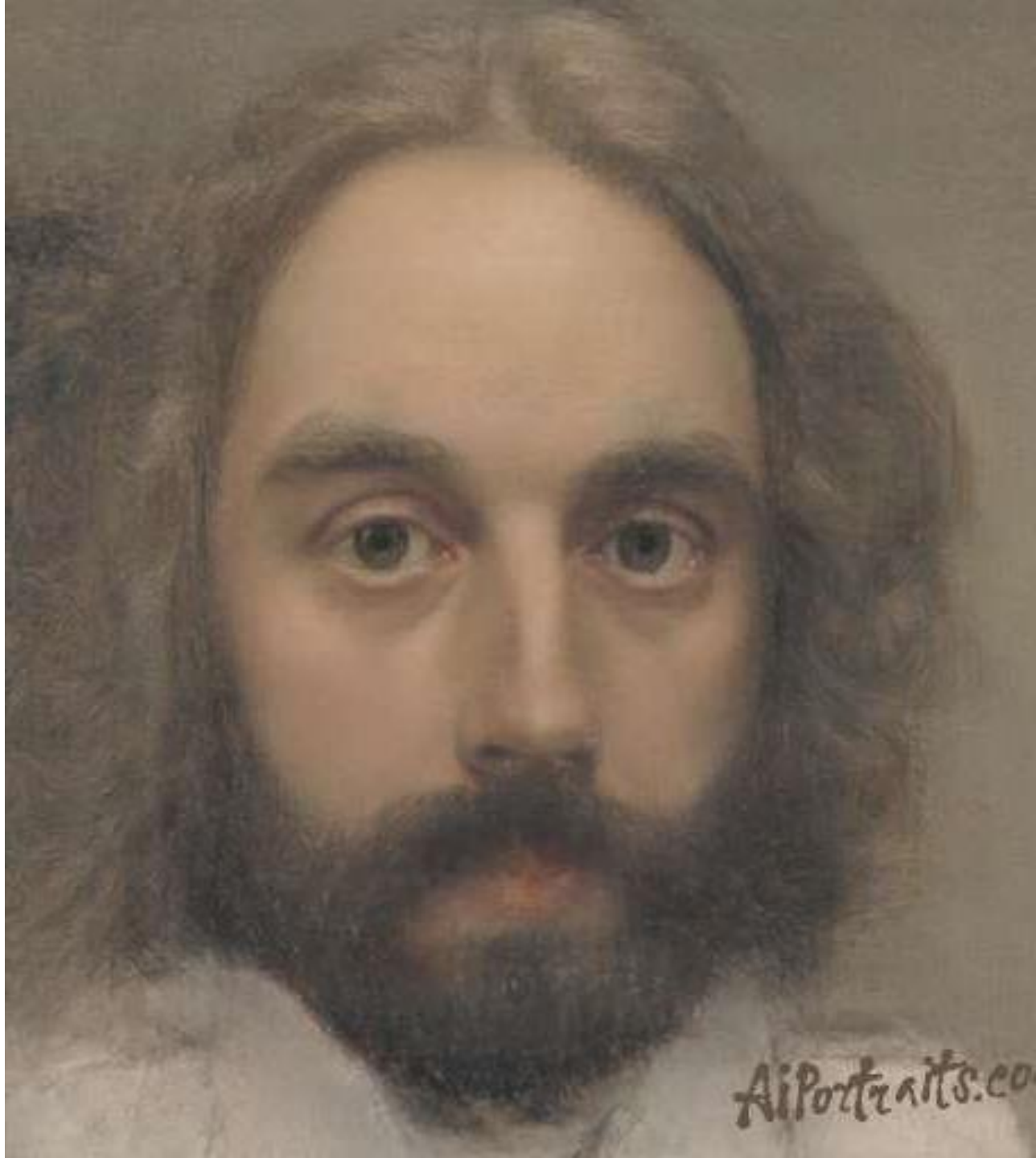
- Instructors:
  - Lorenzo Rosasco
  - Sasha Rakhlin

Faces

- Instructors:
  - Lorenzo Rosasco
  - Sasha Rakhlin
  - Tomaso Poggio

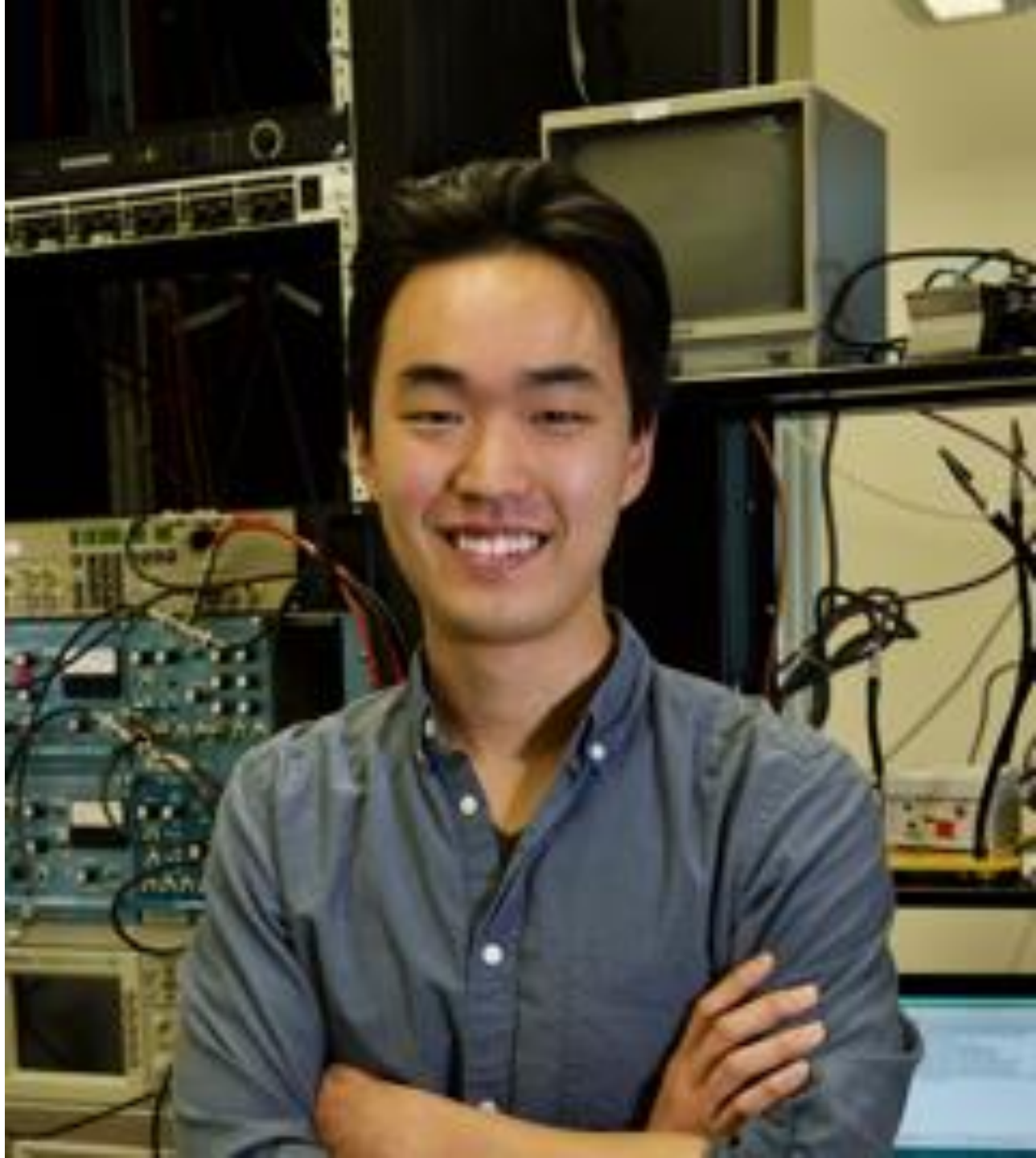
Faces

- Instructors:
  - Lorenzo Rosasco
  - Sasha Rakhlin
  - Tomaso Poggio
  - Andy Banburski (also head TA?)



Faces

- Instructors:
  - Lorenzo Rosasco
  - Sasha Rakhlin
  - Tomaso Poggio
  - Andy Banburski (also head TA?)
- TAs:
  - Michael Lee



Faces

- Instructors:
  - Lorenzo Rosasco
  - Sasha Rakhlin
  - Tomaso Poggio
  - Andy Banburski (also head TA?)
- TAs:
  - Michael Lee
  - Qianli Liao

Faces

- Instructors:
  - Lorenzo Rosasco
  - Sasha Rakhlin
  - Tomaso Poggio
  - Andy Banburski (also head TA?)
- TAs:
  - Michael Lee
  - Qianli Liao
  - Morteza Sarafyazd

Faces

- Instructors:
  - Lorenzo Rosasco
  - Sasha Rakhlin
  - Tomaso Poggio
  - Andy Banburski (also head TA?)
- TAs:
  - Michael Lee
  - Qianli Liao
  - Morteza Sarafyazd
  - Abhimanyu Dubey

Syllabus at a glance

Class	Date	Title	Instructor(s)
Class 01	Thu Sep 05	The Course at a Glance	TP
Class 02	Tue Sep 10	Statistical Learning Setting	LR
Class 03	Thu Sep 12	Regularized Least Squares	LR
Class 04	Tue Sep 17	Features and Kernels	LR
Class 05	Thu Sep 19	Logistic Regression and Support Vector Machines	LR
Class 06	Tue Sep 24	Learning with Stochastic Gradients	LR
Class 07	Thu Sep 26	Implicit Regularization	LR
Class 08	Tue Oct 01	Large Scale Learning by Sketching	LR
Class 09	Thu Oct 03	Sparsity Based Regularization	LR
Class 10	Tue Oct 08	Neural networks: Introduction, backpropagation	LR
Class 11	Thu Oct 10	Convolutional Neural Networks	AB
Tue Oct 15 - Columbus Day			
Class 12	Thu Oct 17	Statistical Learning I	AR
Class 13	Tue Oct 22	Statistical Learning II	AR
Class 14	Thu Oct 24	ERM, Uniform Convergence	AR
Class 15	Tue Oct 29	Sample Complexity via Rademacher Averages	AR
Class 16	Thu Oct 31	Margin Analysis for Classification	AR
Class 17	Tue Nov 05	Local Methods	AR
Class 18	Thu Nov 07	Sample Compression, Stability	AR
Class 19	Tue Nov 12	Privacy and Information-Theoretic Stability	AR
Class 20	Thu Nov 14	Online Prediction	AR
Class 21	Tue Nov 19	Sample complexity of Neural Networks	AR
Class 22	Thu Nov 21	Guest lecture	
Class 23	Tue Nov 26	Guest lecture	
Thu Nov 28 - Thanksgiving			
Class 24	Tue Dec 03	Deep Learning Theory: Approximation	TP
Class 25	Thu Dec 05	Deep Learning Theory: Optimization	TP
Class 26	Tue Dec 10	Deep Learning Theory: Generalization	TP
Wed Dec 11 - Project reports due			

Grading policies

Problem sets (0.6)

- 4 problem sets (0.15 each)
  - 2 - 3 questions (exercises and/or MATLAB)
  - 1 week due
- Late policy on next slide
- typeset in LaTeX (template will be provided)
- Online submission by due date

Project (0.3)

- See later

Participation (0.1)

- *Attending class lectures is required!*
- Sign-in sheet will be circulated on random lectures

Problem sets

- Problem sets (0.6)
  - 4 problem sets (0.15 each)
    - 2 - 3 questions (demonstrations/exercises + short MATLAB)
    - 7 days due!
  - typeset in LaTeX (template provided)
  - *online submission by due date*
- ***Late policy***
  - All students have 4 free late days (to be used on psets and project proposal)
  - You may use up to 2 late days per assignment with no penalty
  - Beyond this, we will deduct a late penalty of 50% of the grade per additional late day
- **Dates (due times are 11:59 pm). Submission online (on Stellar).**

  Problem Set 1, out: Sep. 19, due: Wed., Sep. 25 (Class 07).
  Problem Set 2, out: Oct. 03, due: Wed., Oct. 09 (Class 10).
  Problem Set 3, out: Oct. 31, due: Wed., Nov. 06 (Class 18).
  Problem Set 4, out: Nov. 14, due: Wed., Nov. 20 (Class 21).

- **Collaboration policy: You may discuss with others but need to work out your own solution.**

Projects

Theory

Algorithms

Review

Application

- This is not a data science course, so we will not consider data preparation as contributing to the grade.

report (NIPS format): 5 pages + references

Dates

- Abstract and title: Nov. 1
- Feedback and approval: Nov. 8
- Report submission: Dec. 11