6.003: Signals and Systems

Lecture 7:
Applications of Least-Squares

October 2, 2012

Overview of the Course

- Part 1: Abstractions and Linear Algebra
  - Signals as vectors, Systems as linear maps (matrices)
  - Properties of Linearity
  - Matrix Decompositions
  - Least-squares Optimization
- Part 2: Linear Time-Invariant Systems
  - Convolution
  - Frequency Domain
  - Discrete-time Fourier Transform
  - Z Transform
  - Continuous-time Fourier Transform
  - Laplace Transform
  - Filter Design, Stability Analysis, Feedback Control, ...

This week

Today:

- More discussion about least squares
- Applications and Examples

Wednesday is Quiz 1 (details on front page of website)

Thursday: Start transition from Linear Algebra to LTI Systems

Goals and Expectations for Linear Algebra

- Linear Algebra as a tool
- Will *not* ask you to:
  - Solve for eigenvectors / eigenvalues
  - Invert a matrix
  - Factor a matrix
- We *do* expect you to:
  - Understand when to use these tools
  - Understand their properties
  - Recognize a valid solution (e.g. “if MATLAB were to tell you the wrong thing, would you know?”)
- 20 questions and Practice Quiz give examples

Least Squares

Review concepts on the blackboard

Example: Fitting a line to data

Application: Character Recognition

Application: Approximate Inverses

Tomorrow's Quiz

Wednesday, October 3, from 7:30pm to 9:30pm in room 6-120.
It covers material up until last Thursday's lecture (Least Squares).

- There is no recitation on Wednesday (due to the quiz in the evening).
- The quiz is closed book. You are allowed to bring 1 sheet (8.5 x 11, front and back) of handwritten notes.
- QUIZ REVIEW SESSION: Tarek will offer an explicit quiz review session on Tuesday at 7pm during the block office hours.
- In addition to the usual open office hours, the TAs will provide the following additional office hours:
  - Tuesday, 4:15-6pm, in the Stata basement (usual block office hours location)
  - Wednesday, 11am-12, in 34-301 (the normal recitation location)
  - Wednesday, 2-3pm, in 34-301