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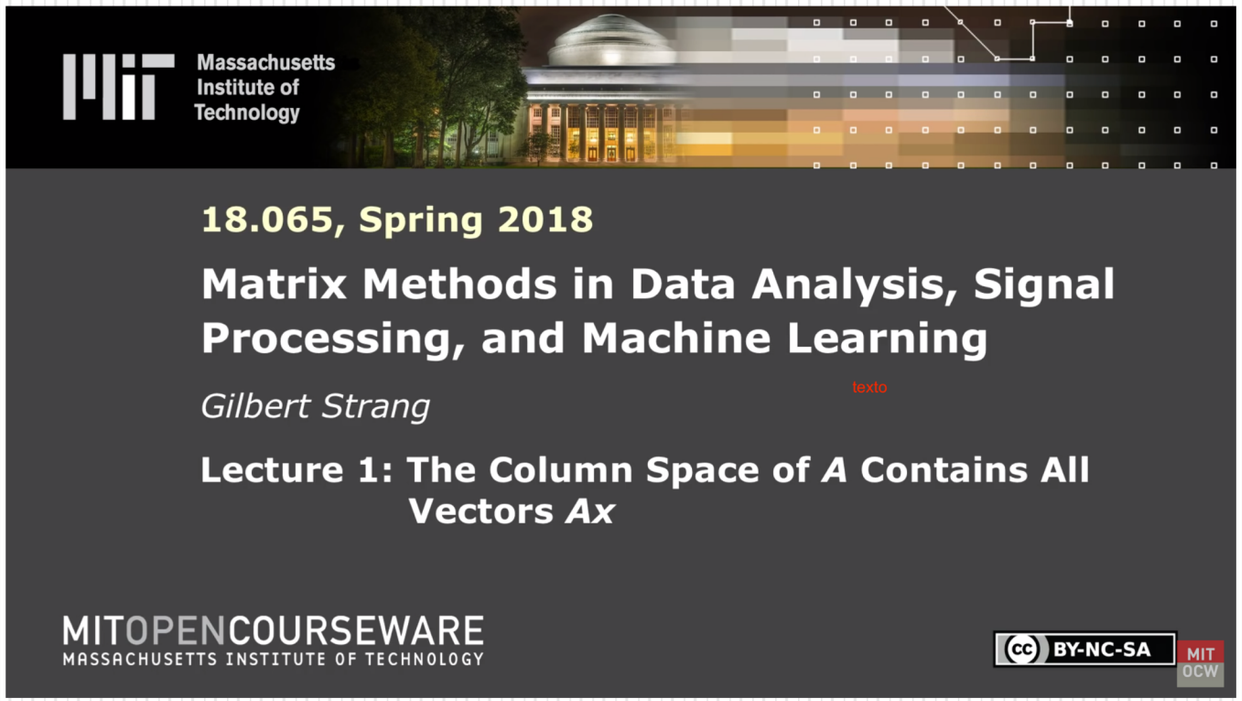
Matrix Methods in Data Analysis, Signal Processing, and Machine Learning



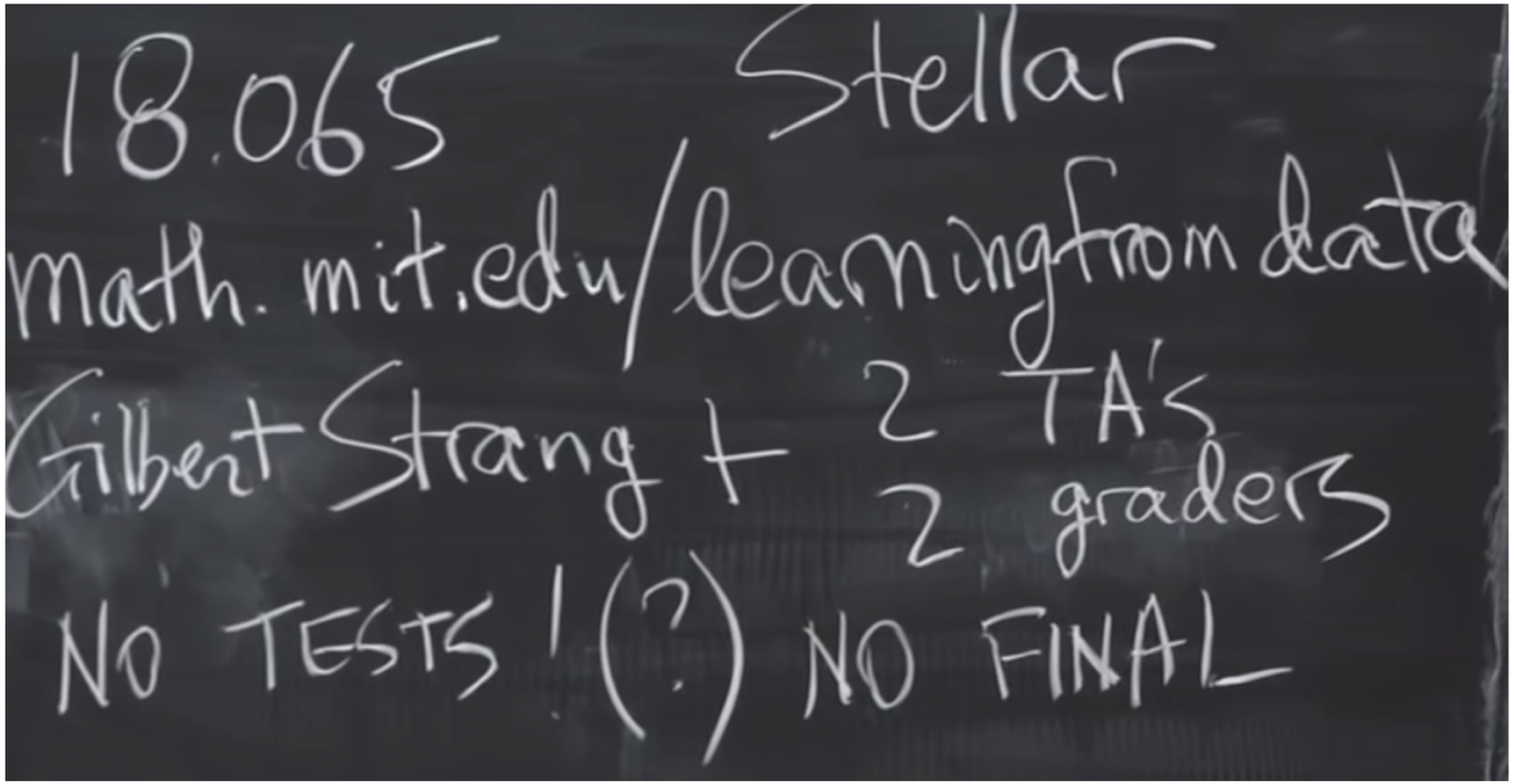
Lecture 1:
The columns space of A contains all vectors Ax

- Independent columns = basis for the column space
  Rank = number of independent columns
  A=CR leads to: Row rank equals column rank

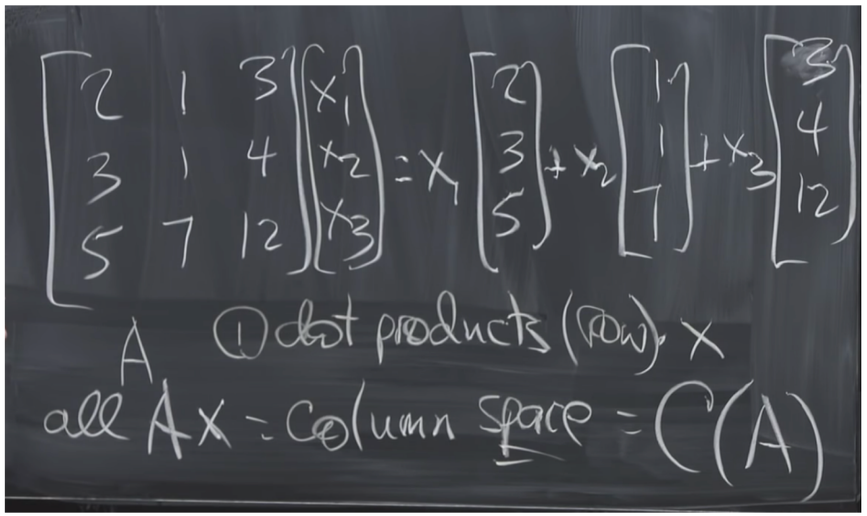
- Related section in textbook: I.1

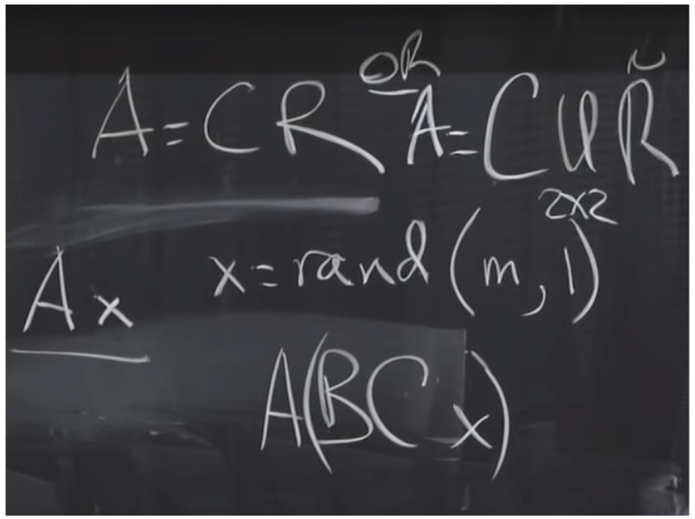
Lecture 1:

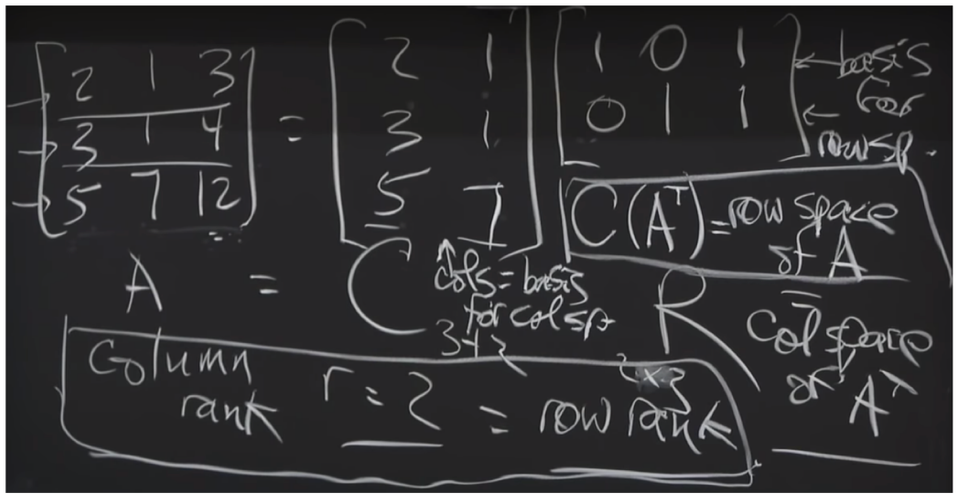
The columns space of A contains all vectors Ax

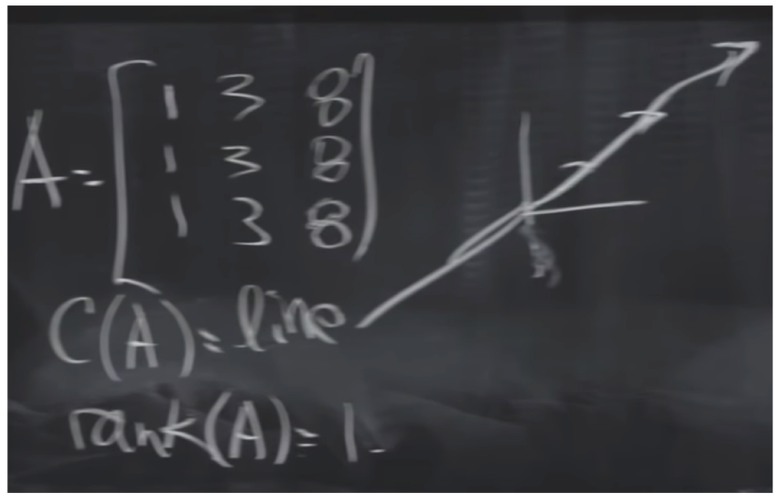


Lecture 1

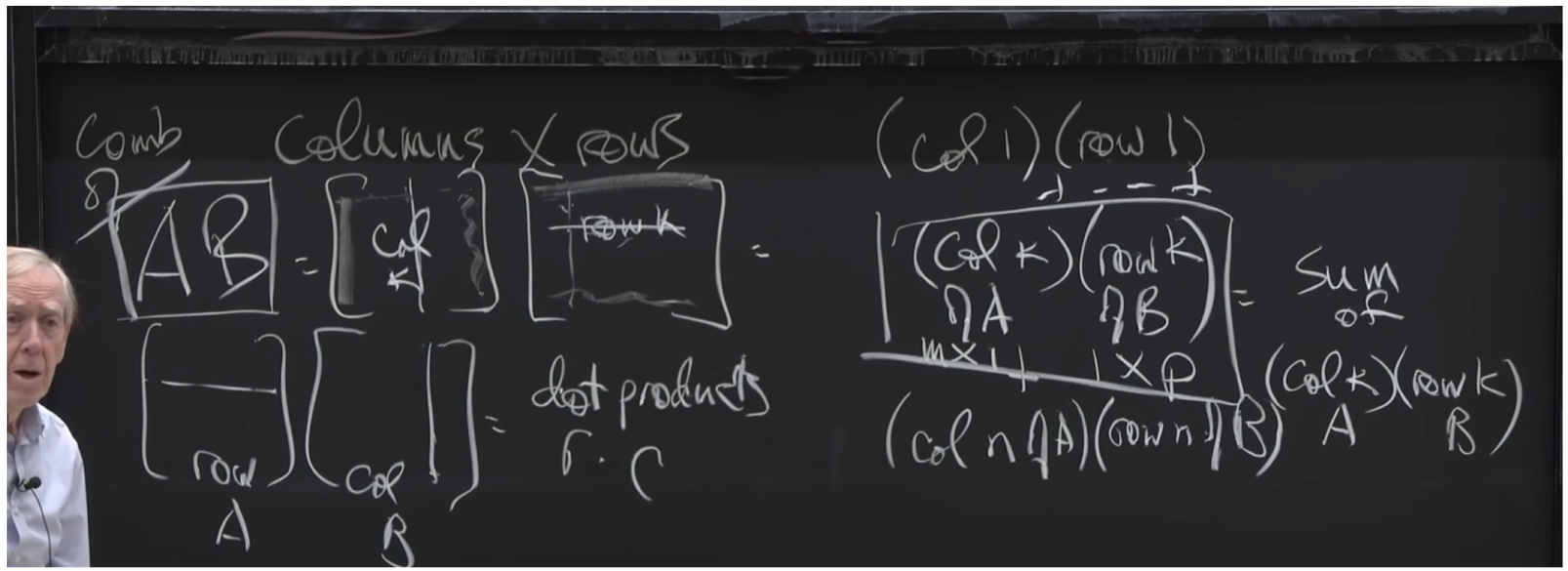

A
① dot products (row) × x
all Ax = Column space = C(A)

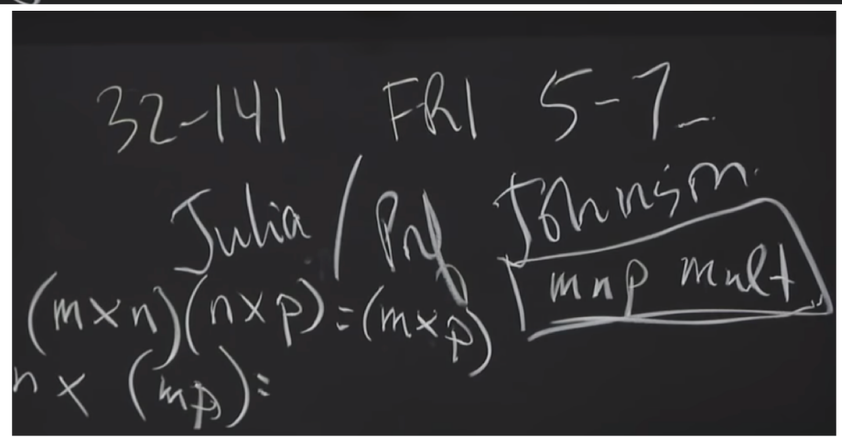

A = CR
or
A = CUR
Ax
x = rand(m, 1)
A(Bx)


A =
basis for row sp
C(A^T) = row space of A
cols = basis for col sp
Column rank r = 2 = row rank
Col space of A^T


A =
C(A) = line
rank(A) = 1

Lecture 1


Comb
Columns X rows
AB
row k
col k
row
A
col
B
dot products
r · c
(col 1)(row 1)
(col k)(row k)
mx1
1xp
Sum
of
(col n A)(row n B)
(col k)(row k)
A
B

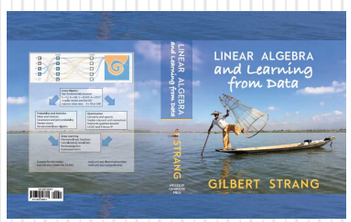

32-141 FRI 5-7
Julia / Pkg
Johnson
mnp mult
(m x n)(n x p) = (m x p)
n x (mp) =

https://github.com/aegiloru/lald

Credits

https://ocw.mit.edu/courses/mathematics/18-065-matrix-methods-in-data-analysis-signal-processing-and-machine-learning-spring-2018/index.htm

Gilbert Strang Web Site http://www-math.mit.edu/~gs/



http://math.mit.edu/~gs/learningfromdata/