

Math 342W / 642 / 742W

Recitation – Day #6 (2.20.25)

I. Regression Model Performance Metrics

Write down the performance metrics we apply to regression models:

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II. Multivariate Linear Regression

(i) Define the set of candidate functions of interest, \mathcal{H} .

(ii) Define the following terms for *multivariate linear regression* ($p > 1$):

- \mathbb{D}
- w
- X
- \hat{y}
- y
- e

(iii) Derive the expression for *sum of squared errors* (SSE) that will be the objective function:

(iv) Define the goal/optimization problem in multivariate linear regression:

III. Linear Algebra & Calculus Interlude

Define the relevant rules from linear algebra and calculus for multivariate linear regression:

- Rule # 0:
- Rule # 1:
- Rule # 2:
- Rule # 3:

- Rule $\neq 0$:

- Rule # 1:

IV. Least Squares

(i) Derive the *normal equations* that come from the **least squares** method for fitting a linear model to a given set of training data:

(ii) What condition must hold for the existence of a unique solution to the *normal equations*?

(iii) Express the solution to the *normal equations*:

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(ii) What condition must hold for the existence of a unique solution to the *normal equations*?

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