1. Linear Algebra Data Structures
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Matrixs property

1. Frobenius Norms;

||X||f = ʃƩi,j Xi,j2

2. Matrix Multiplication:

3 4 1 3\*1 + 4\*2 3+8 11

Matrixs \* vector

5 6 2 = 5\*1 + 6\*2 = 5+12 = 17

7 8 7\*1 + 8\*2 7+16 23

3 4 1 9 3\*1+4\*2 3\*9+4\*0 11 27

5 6 2 0 = 5\*1+6\*2 5\*9+6\*0 = 17 45

Matrixs \* Matrixs

7 8 7\*1+8\*2 7\*9+8\*0 23 63

Matrix inverse

Matrix Inverse of X is denoted as X-1

Satisfies : X-1X=In (identity)

1 0 0 0

0 1 0 0

0 0 1 0

0 0 0 1

I4

Y1 = I X1,1 X1,2 . . . X1,m a

n cases tall

Y2 = I X2,1 X2,2 . . . X2,m b

W Vector

. . . . . . . .

. . . . . . . .

Yn = I Xn,1 Xn,2 . . . Xn,m m

m features wide

The Regression formla can be represented as ;

Y=Xw (w is the vector of weights a through m )

Y is the outcome; X is the predictors ;

w contains **unknowns**, the model’s learnable parameters;

Assuming X-1 exists, matix inversion can solve for w:

Xw=y | multiply both sides by X-1

X-1 Xw = X-1y

Inw= X-1y

| symmetric identity matrixes; when you multiply a vector with identities

we just end up with that vector.

* W = X-1y

4f + 2c = 4

-5f - 3c = -7

X1,1 X1,2 4 2 4

X = X2,1 X2,1 = -5 -3 Y = -7

1. Apply the identity matrix I3 to the vector u.
2. Apply the matrix B to the Vector u
3. Concatenate vector u with vector u2 to form a matrix U,then apply the matrix B to the Matrix U

2 0 2 0 -1

u = 5 u2 = -4 B = -2 3 1

3 6 0 4 -1

Solution:

2 0

U = 5 -4

-3 6

(1)

2

I3u = 5 Refer matrix Multy Ex 2

-3

(2)

4 0 3 7

Bu = -4 15 -3 = 8 Refer matrix Multy Ex 1

0 20 3 23

(3)

0 0 -6 -6

B u2 = 0 -12 6 = -6 Refer matrix Multy Ex 3

0 -16 -6 -22

7 -6

BU = 8 -6

23 -22