Linear Algebra

A+B	has result, only if A and B have same dim
A**x**=x_1***a_1**+...+x_n***a_n**	result is vector
A*B	row of A times column of B, result is matrix
A^T	row becomes column and vice versa
Properties of transpose	(1) if A is (m x n) A^T is (n x m) (2) $(A^T)^T=A$ (3) $(A+B)^T=A^T+B^T$ (4) $(AB)^T = B^TA^T$ (5) $(tA)^T=tA^T$
Inverse of Matrix	$AA^{-1}=I=A^{-1}A$
Properties of invertible matrix	$(A^{-1})^{-1}= A$ $(AB)^{-1}= B^{-1}A^{-1}$ $(A^T)^{-1}=(A^{-1})^T$
Singular value decomposition	$A = U\Sigma V^T$ what means that every vector-matrix-multiplication can be viewed as a 3 step process (1) rotation into space V (2) scaling by singular value (3) rotation into new space U
Eigen value decomposition	$A = Q\Lambda Q^{-1}$ this is only possible, if A ***and*** Q are square matrices

Linear regression

Model	$\mathbf{y} = X\theta^* + z$
Risk	

Ridge regression

Logistic Regression

Support Vector Machines

Neuronal Networks

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