Video Lectures

Help

Having trouble viewing lectures? Try changing players. Your current player format is html5. Change to flash.

Week 0: The Function and the Field

- Course Introduction Part 1 (9:53)
- Course Introduction Part 2 (8:49)
- The Function: The function and other preliminaries (20:55)
- The Field: Introduction to complex numbers (5:52)
- The Field: Playing with C (15:19)
- The Field: Playing with GF(2) (10:28)

Week 1: The Vector

- The Vector: What is a vector? (8:20)
- The Vector: Vector addition and scalar-vector multiplication (10:16)
- The Vector: Dictionary-based representations of vectors (9:10)
- The Vector: Vectors over GF(2) (9:18)
- The Vector: Dot-product (8:49)

Week 2: The Vector Space

- The Vector Space: Linear combinations
- The Vector Space: Span
- The Vector Space: Geometry of Sets of Vectors
- The Vector Space: Vector spaces
- The Vector Space: Checksum function

Week 3: The Matrix

- The Matrix: What is a matrix?
- The Matrix: Matrix-vector and vector-matrix multiplication
- The Matrix: Matrix-vector multiplication in terms of dot-products
- The Matrix: Null space
- The Matrix: Error-correcting codes
- The Matrix: Matrices and their functions
- The Matrix: Linear functions
- The Matrix: Matrix-matrix multiplication

Week 4: The Basis

- The Basis: Coordinate systems
- The Basis: Lossy compression
- The Basis: Algorithms for finding a set of generators
- The Basis: Minimum spanning forest
- The Basis: Linear dependence
- The Basis: Basis
- The Basis: Unique representation
- The Basis: Change of basis
- The Basis: Perspective rendering
- The Basis: Perspective rectification
- The Basis: The Exchange Lemma

Week 5: Dimension

- Dimension: The size of a basis
- Dimension: Dimension and rank I

Week 6: Gaussian Elimination and the Inner Product

- Gaussian Elimination: Echelon form
- Gaussian Elimination: Transforming a matrix to echelon form
- Gaussian Elimination: Using Gaussian elimination to solve a system of equations
- Gaussian Elimination: Factoring integers
- The Inner Product: The inner product
- The Inner Product: Orthogonality

Week 7: Orthogonalization

- Orthogonalization: Finding the closest point in a plane
- Orthogonalization: Projection orthogonal to multiple vectors
- Orthogonalization: Building an orthogonal set of generators
- Orthogonalization: Computing a basis
- Orthogonalization: Orthogonal complement
- Orthogonalization: Two ways to find a basis for the null space
- Orthogonalization: The QR factorization

Tutorials

How to submit assignments