

Review 2

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Topics Covered

Problem Solving with Thinking	Problem Solving with Computer Science	Data Science & Informatics
Computational Thinking	Variables	Definition
Design Thinking	Conditionals (Selection)	Data Visualization
Creative Thinking	Loops (Repetition)	Data Mining
Statistical Thinking	Arrays	Big Data
Advanced Statistical Thinking	Standard I/O, File I/O	Artificial Intelligence
	Functions	
	Database	

Thinking: Advanced Statistical Thinking

- Null hypothesis
- Study to nullify a hypothesis
- Statistical significance and p -value

CS: Standard I/O, File I/O

- Standard I/O: for screen
 - `input()`, `print()`
- File I/O: program reading in files as inputs, and writing out files as outputs
- What are the benefits of File I/O?
- CSV, texts

CS: Functions

- Modularity, extensibility, maintainability
- Problem decomposition
- Parameters and arguments
 - Scope of variables
 - “What happens in Vegas stays in Vegas”
- Functions that return value(s)
- How to call a function
 - How to call a function that returns a value
- How to stitch functions together into a bigger, composite function

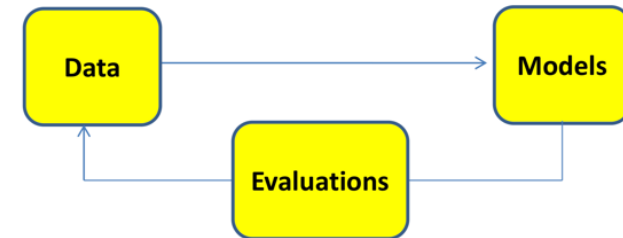
CS: Database

- Entity-Relationship Diagram
- SQL queries
- Benefits

DS&I: Data Visualization

- Human visual perception and cognition is powerful
- Challenges
 - Large, multivariate or multidimensional data
- Benefits
- Knowledge Discovery Pipeline

Human's Knowledge Discovery Pipeline



DS&I: Data Mining

- Finding patterns that are **novel, valid, meaningful**, and **useful**
- Four general tasks: **Clustering, Classification, Regression, Association**
- Challenges
- Benefits

DS&I: Big Data and AI

- Challenges of Big Data (as opposed to dealing with small data)
- Three waves of AI
- Key domains for AI impact
- Promising areas of AI