

# CS540 Introduction to Artificial Intelligence

## Lecture 22

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Based on lecture slides by Jerry Zhu and Yingyu Liang

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# Coverage

- Unsupervised Learning
- Search

# Unsupervised Learning

- Hierarchical Clustering
- K Means Clustering (no Gaussian mixture)

# Single Complete Linkage Example

# Principal Component Analysis

- Basic Linear (Matrix) Algebra
- Compute Projection and Variance (use formula on the formula sheet)
- Feature Reconstruction

# Matrix Multiplication Example

# Projected Variance Example

# Search

- Uniformed: no hueristic
- Informed: hueristic
- Local: optimization
- Adverserial: sequential move game
- Equilibrium: simultaneous move game



# Uniformed Search

- BFS
- DFS
- IDS
- UCS

# Informed Search

- Greedy
- A (or A Star)

# Uniformed Search Counting Example

# Informed Search Complete Graph Example

# Local Search

- Hill Climbing
- Simulated Annealing
- Genetic Algorithm

# SAT Local Search Example

# Adverseial Search

- Minimax
- Alpha Beta

# Alpha Beta Max Pruning



# Equilibrium Search

- IESDS
- Best Responses (Nash)
- Fixed Point (Nash)

# Bargaining Example