

605.645 - AI

Reasoning

W01 State Space Search

- State, Actions, Transitions, Costs
- DFS, BFS
- Uniform-Cost Search, Greedy Search, A*
- PA: A*

Find a path

Heuristics

W05 Adversarial Search

- Game Theory
- Min-max, Alpha-beta pruning
- expectimax algorithm
- PA: Solving Normal Form Games

W06 Constraint Satisfaction Problems

- Sudoku, N-Queens, Cryptoarithmic
- Backtracking search with forward checking
 - Minimum remaining values
 - Degree heuristic
 - Least constraining value
- Conflict directed back-jumping

PA: Map Coloring

W07 Logic

- Automated reasoning
 - Forward
 - Backward chaining
- PA: Unification

W10 Planning

- Algorithm
 - STRIPS
 - GraphPlan
- PA: Forward Planner

Big picture

- Symbolic AI
 - GOFAI (Good old fashion), still kicking. Reviving
- Hybrid AI + AI in Production
- Modern AI
- W04 Real world AI
 - Streamlit

Optimization

W02 Optimization

- Local search
 - Hill climbing
 - Simulated Annealing
 - Evolutionary computation
 - Swarm Optimization
- PA: Genetic Algorithm
- String match

W12 Regression and SVM

- Gradient descent
- SVM
- Linear and non-linear separability and the role of "The Kernel Trick"
- PA: Logistics regression

Pattern Recognition

W03 Pattern Recognition

- Machine learning
 - CBR: Case based Reasoning
 - Recommendation systems
- Model evaluation
 - MSE + Confusion matrices
 - Validation curves
 - Tune hyper-parameters
 - Learning curves
 - More data help models?
- PA: KNN
- Lazy Learning

W08 Decision Trees

- ID3, C4.5, Random Forest
- PA: Decision Trees

W09 Bayesian Networks

- Reasoning under uncertainty
- Variable elimination + Gibbs sampling
- PA: Naive Bayes Classifier

W11 Reinforcement Learning

- Value iteration, Q-learning, SARSA
- PA: Value iteration

W13 Artificial Neural Networks

- Perceptron, multi-layer, back-propagation
- PA: ANN determines terrain