CS572 intelligent robotics

지능형 로보틱스

Welcome to CS572! This subject is concerned with the nature, algorithm, formulation and analysis of intelligent algorithms in the view of robotic applications. Even though the subject title is “intelligent robotics”, the intelligent algorithms covered by this subject can be applied to any wide of intelligent system designs. This subject aims to summarize well-established theoretical knowledge and present practical demonstrations. Algorithm perspective in intelligent system designs will be focused on. The algorithms in both probabilistic and deterministic models will be taught. At the end of course, you will be able to unify the overall algorithms in an underlying concept and obtain an integrated engineering intuition over introduced algorithms.

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Lecture hours: 10:30 – 11:45 AM, every Monday and Wednesday
Lecture room: N1 - 102
Prerequisites: Some background in linear algebra and probability may be helpful.

Grading (tentative):
Your grade will be determined by considering:
Class participation
Lecture note writing
Term project & report & presentation
Final exam (?)

Above grading strategy is tentative. Class participation is surely important for grading. Each student is responsible for sharing lecture notes. Detail on term project is announced in the first class.

Texts:
No specific text book is required because the course material comes from various fields. Instead, lecture handout or reading material will be regularly prepared to promote your understanding.

Schedule (tentative): (for each week)

 Probabilistic temporal models
- Hidden Markov Model
- Filtering, Predicting, Smoothing, Most-Likely Explanation
- Expectation-Maximization

 Optimal control
- Optimization
- Optimal Control
- Dynamic Programming and Optimal Control

 System estimations

- Least Squares Estimation, Online Least Squares Estimation
- Random Process
- Kalman Filter, Extended Kalman Filter, Continuous Kalman Filter

 Deep learning for sequential data
- Recurrent Neural Network (RNN)
- LSTM vs. GRU
- RNN with attention
- RNN applications for robotics

 Adaptive control
- Nonlinear Stability (Lyapunov Theory)
- PD Control, Impedance Control
- Adaptive Control, Parameter Convergence

 Presentations

*Schedule is subject to change.
