Dissertation Progress Report

March 27, 2013

Dissertation writing related tasks:

Dissertation chapters completed:

- Chapter 1: Introduction
- Chapter 2: Supporting Wilderness Search and Rescue with Integrated Intelligence: Autonomy and Information at the right time and the right place (Conference paper published at AAAI)
- Chapter 3: Related work
- Chapter 4: A Bayesian approach to modeling lost person behaviors based on terrain features in Wilderness Search and Rescue (Journal paper published at Computational and Mathematical Organization Theory)
- Chapter 5: UAV intelligent path planning for Wilderness Search and Rescue (Conference paper published at IROS)
- Chapter 6: Hierarchical heuristic search using a Gaussian Mixture Model for UAV coverage planning (Journal paper submitted to IEEE Tran. on Systems, Man, and Cybernetics, Part B)
- Chapter 7: Hierarchical search and decision making for path planning algorithms (Supplemental chapter describing algorithm selection process and coarse-to-fine path search)

Dissertation chapters work-in-progress:

- Chapter 8: Gesture control interface for information management (Supplemental chapter to describe system components)
- Chapter 9: Hierarchical spatial and temporal information management using sliding autonomy in UAV path planning (Will be submitted to HRI conference)
- Chapter 10: Summary and Future work

System Components Related tasks:

<table>
<tr><th></th><th>Probability Distribution Map</th><th>Task Difficulty Map</th></tr>
<tr><td>Strategic</td><td>Terrain-based Map Generation/Management Modules</td><td>Vegetation-based Map Generation/Management Modules</td></tr>
<tr><td>Between-Episodes</td><td>Dist. Map Management Module</td><td>Diff. Map Management Module</td></tr>
<tr><td rowspan="2">Within-Episode</td><td colspan="2">Intelligent Path Planning Algorithms</td></tr>
<tr><td colspan="2">Sliding Autonomy Interface</td></tr>
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Work completed:

- TerrainMod: Terrain-based Map Generation Module
- ParamMod: Terrain-based Map Management Module (Leave for future work)
- VegeMod: Vegetation-based Map Generation Module
- TDMod: Vegetation-based Map Management Module (Leave for future work)
- IPPA: Intelligent Path Planning Algorithms
    - All support partial detection
    - All support task-difficulty map
    - New algorithms developed to address real WISAR scenarios with task-difficulty map and partial detection
    - Path planner server takes path planning requests over TCP/IP network

Work in progress:

- DistMod: Gesture Controlled Probability Distribution Map Management Module
- DiffMod: Gesture Controlled Task Difficulty Map Management Module
- SlideMod: Sliding Autonomy Interface for UAV real time path planning

Dissertation Schedule:

- Complete Sliding Autonomy interface and perform pilot study in April 2013
- Complete Sliding Autonomy user study in May 2013
- Complete Dissertation chapter 9 about sliding autonomy in May 2013
- Complete DistMod and DiffMod modules in May 2013
- Complete Dissertation chapter 8 about gesture interfaces in June 2013
- Complete Dissertation chapter 10 summary and future work in June 2013
- Submit HRI paper in July 2013
- Defend dissertation in August 2013