Synergies of AI methods for Robotic Planning and Grabbing, Facial Expressions Recognition and Blind's Navigation

Nikolaos G. Bourbakis

Information Technology Research Institute &

Department of Computer Science and Engineering

Wright State University

3640 Colonel Glenn Highway

Dayton, Ohio 45435-0001

USA, bourbaki@cs.wright.edu

Abstract Artificial Intelligent (AI) techniques have reached an acceptable level of maturity as single entities and their application to small and simple problems have offered impressive results. For large scale and complex problems, however, these AI methods individually are not always capable to offer satisfactory results. Thus, synergies of AI methods are used to overcome difficulties and provide solutions to large scale complex problems. This talk presents several synergies of AI methods for solving different complex problems. In particular, the first synergy combines AI planning, stochastic Petri-nets and neural nets for coordinating two robotic hands for boxes placement, and neuro-fuzzy nets for robotic hand grabbing. The second synergy is based on neural color constancy for skin detection and enriched with fuzzy image segmentation & regions synthesis and local global (LG) graphs method for biometrics application by detecting faces and recognizing facial expressions. The third synergy uses several image processing and computer vision techniques in combination with formal modeling of vibrations to offer to the blind 3D sensations of the surrounding space for safe navigation. Examples from other synergistic methodologies, such as, body motion-tracking and robotic 3D brain surgery are also presented.