SIGML - LECTURE
SPECIAL INTEREST GROUP IN MACHINE LEARNING
[Cognitive Science Group Talk]

Group of colleagues from the HSS, Computer Science & BSBE departments are in the process of forming a reading group interested in different areas of Cognitive Science i.e. an interdisciplinary field that is concerned with studying the workings of the human mind, from a variety of perspectives from Psychology, Philosophy, Linguistics, Computer Science, Neuroscience, few disciplines from the Engineering domain etc. We are excited & looking for more of you who would be interested in the workings of the human mind & maybe even interested in joining us in our research & teaching endeavours.

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Title : Personal views of space : A computational approach towards the genesis of place cells [work done with M. Seetha Ramaiah and Divyanshu Bhartiya]

Speaker : Prof Amit Mukerjee

Time : 24/11/2015 at 5:00 P.M.

Location : R.No. 103 KD

The ability to plan motions, and to refer to objects and events, both depend on neural circuits that integrate body pose within a representation of space. It is thought that our memories, and hence our declarative knowledge, are indexed via a spatial code, centered on the hippocampus and nearby areas in the mammalian (and possibly avian) brain. The clearly spatial firing in place cells (e.g. in the rat hippocampus) provides a fascinating glimpse of one of the clearest neuronal correlates of cognition.

However, how such a computation is implemented is poorly understood. The two mechanisms suggested are based on distal landmarks and on path integration. In this computational study, we propose a model based on what may be called {\em view integration}, which "stitches" similar views together to construct a low-dimensional manifold in the sensory space. We show how such a computation can serve to model both a peripersonal space (in which objects and interactions are indexed) and also the extrapersonal space (a model for the cognitive map). We show how structures such as the place cells (in rats) and spatial view cells (in macaques), may arise from such a computation. We further show how motor data can be fused with such manifolds to create more robust and flexible maps. Finally, we suggest that such spatial cues may serve as an index for coding the various modalities of interaction for objects and events. The work suggests that such a view integration model may be working together with path integration and other motor-based structures to construct the rich model of space that animals appear to construct.