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Naval Integration into Joint Data Strategies and Architectures in JADC2

Godin, Arkady A.; Green, John M.

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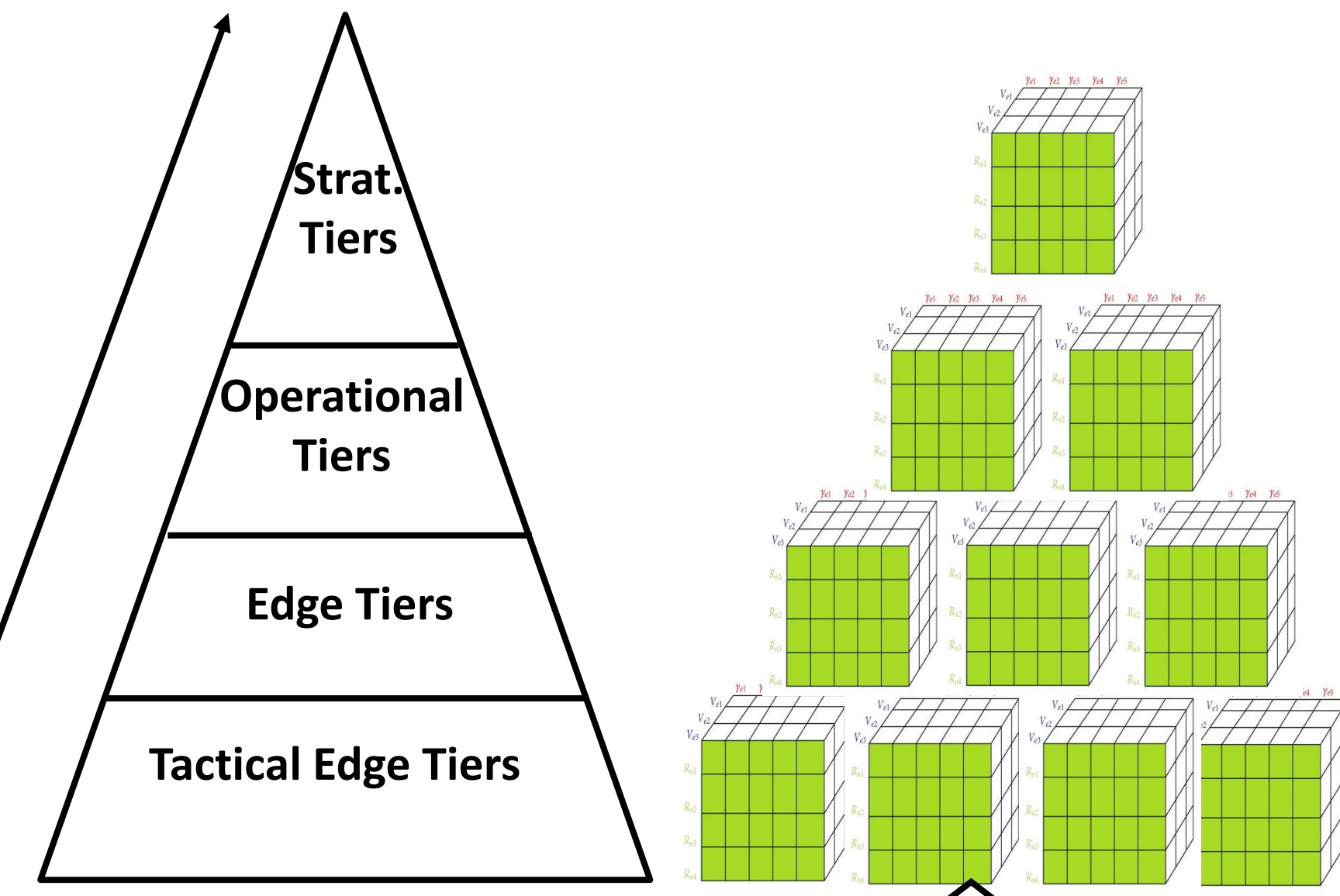
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Naval Integration into Joint Data Strategies & Architectures in JADC2



Naval Postgraduate School

Research focus: Detecting dynamic situations and contexts by applying causal inference methods. Contextual mission battlespace is reasoned over to generate events to adapt to the world model. Context is summarized to fit any of the JADC2 roles.

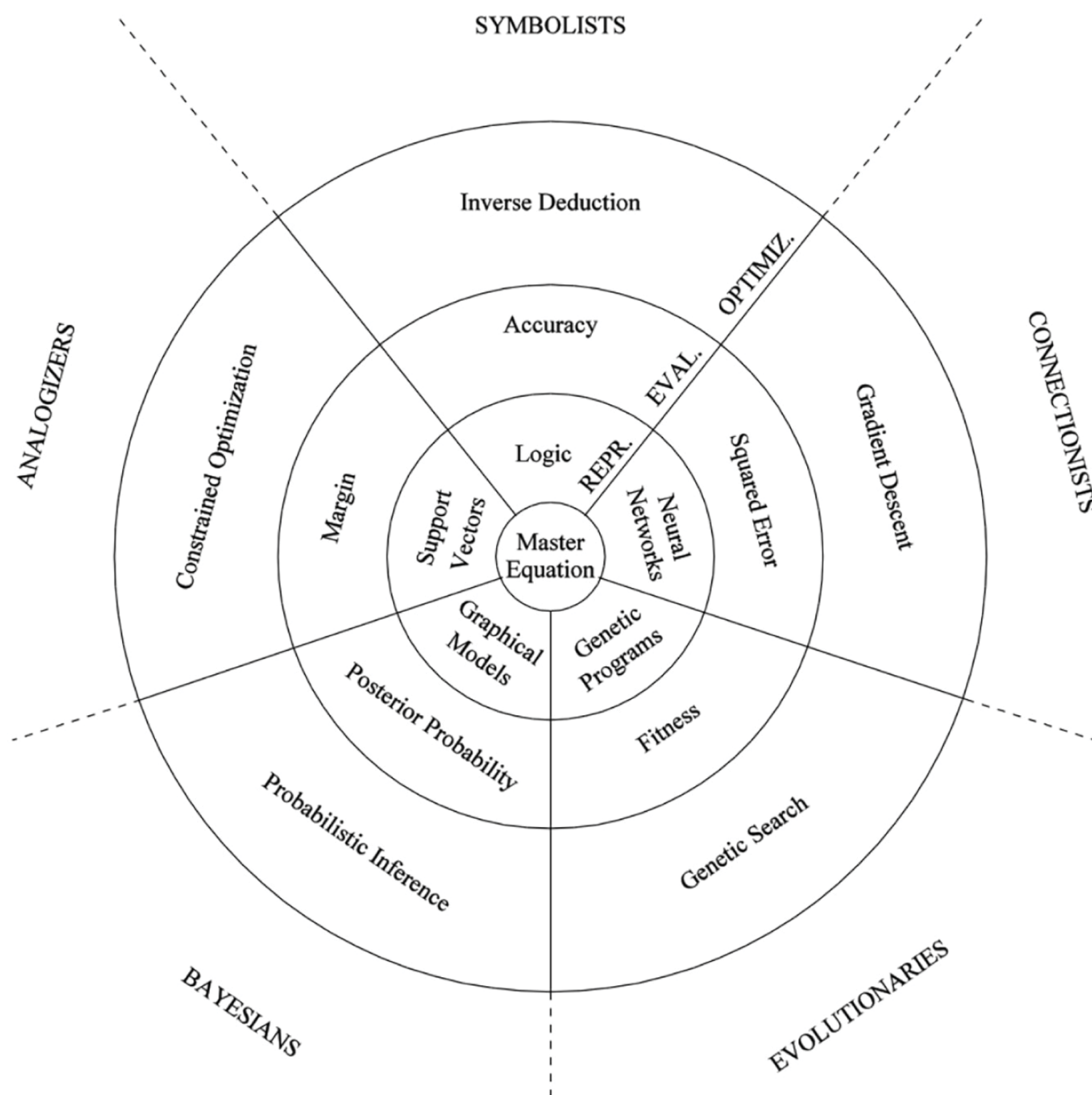


Causal inference and other inferencing techniques require ability of knowledge structured to express logical expressions required by any logic. Causal inferencing requires Subject Matter Experts to define mission-specific Causal Diagrams. Detection of novel situations is 1st step in generating knowledge. Other, than inferencing, calculi-based reasoning enrich State Machine of the world model even further. Focus on content, starting by capitalizing on relations of objects as participants in situations, is a 2nd step. Other reasoning steps include concentration on actions (using action logic), events (using event logic), and ad-hoc events from operations, and any other God-made and man-made Scientific Models-based Joint mission environments.

Aggregation of objects-entities, actions and ad-hoc events in JADC2

Situation/workflow graphs, and 4-D models are embeddable into multi-dimensional cubes with dimensional hierarchies allowing to summarize any contextual artifacts for any JADC2 role. Context may summarize adaptive artifacts (i.e., activities and events)

How to keep “Knowledge In-Situ” to avoid knowledge movement at the Tactical Edge?



An idea of keeping knowledge movement to a minimum keeping “Knowledge In-Situ” capitalizes on idea expressed by Domingo Peter, 2015. The Master Algorithm: How the quest for the ultimate learning machine will remake our world. Basic Boos. The figure in the left presents an idea of a “Master Equation of the Master Algorithm”. The five Tribes of AI are represented in five segments of 360-degree circle, one segment for each of the tribe. Starting from Symbolists, Connectionists, Evolutionaries, and ending up with Bayesians and Analogizers. Considering a minimum goal is to support at least two tribes, Bayesians and Symbolists, there is a clear need identified by having a single knowledge representation capable of expressing a need of unique knowledge representation per each of the five tribes. Prof. Domingos was able to discover a single knowledge representation acting as a canonical knowledge representation capable of expressing the functional needs of any of the five used by each of the 5 tribes of AI.



Researcher: Faculty Associate-Research, Arkady Godin assisted by Senior Lecturer, Mike (John) Green
 NPS Information Sciences and System Engineering Departments
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