

SIG-12: Tutorial on Stochastic Image Grammars for Object, Scene and Event Understanding

June 16, 2012, Providence, Rhode Island

This all-day short course is organized along two major axes -- namely, theoretical foundations, and vision problems. The *theoretical foundations* of SIGs will be discussed in terms of a unified representation of spatial, temporal and causal AND-OR graphs, and their inference and learning. *Vision problems* will also be discussed in terms of applications of AND-OR graphs to answering What, Where, When, and Why queries about objects, scenes, and events.

		Vision problems		
		Objects	Scenes	Events
Theoretical foundations	Spatial			
	Temporal			
	Causal			
	Inference			
	Learning			

08:30 -- 08:45 Song-Chun Zhu

- Historic remarks on Stochastic Image Grammars
- Demo: Joint spatial, temporal, and causal inference by SIG
Answering queries about what, who, when, Where and why

08:45 -- 09:20 Song-Chun Zhu

- Representation:
Spatial AND-OR graph for representing the scene-object-part-primitive hierarchy

09:20 -- 10:00 Sinisa Todorovic

- Inference of SIGs: traditional algorithms
 - Dynamic programming, CYK and Earley parsers
 - Inside-outside algorithm
- Representation: Spatial AND-OR graph for representing the stationary event-activities-primitive actions hierarchy

10:00 -- 10:30 Coffee break

10:30 -- 11:50 Aleš Leonardis

- Representation: compositional representations of object structure
- Inference,
- Learning
- Demo

11:50 -- 12:30 Sinisa Todorovic

- Representation: Temporal AND-OR graph (T-AOG) for representing the event-action-motion primitive hierarchy
- Demo

12:30 -- 1:30 Lunch

01:30 -- 02:15 Sinisa Todorovic

- Inference of S-AOG and T-AOG: Cost-sensitive and goal guided
- Scheduling top-down/bottom-up processes (alpha, beta, gamma)
- Demo

02:15 -- 03:00 Song-Chun Zhu

- Representation and learning:
Causal AND-OR graphs (C-AOG) for representing the causal-action recursion for reasoning
- Demo

03:00 -- 03:30 Coffee break

03:30 -- 04:00 Sinisa Todorovic

- Representation: Probabilistic logic CNF for reasoning
- Demo
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04:00 -- 04:50 Song-Chun Zhu

- Learning of SIGs
- Information projection for learning S-AOG, T-AOG, C-AOG
- Bounds of inductive learning rates

04:50 -- 05:30 All speakers

- Evaluation by querying about WHAT, WHERE, WHEN, WHY
- Open problems
- Q&A session