Institute of
High Performance
Computing

Towards Human-Like Learning

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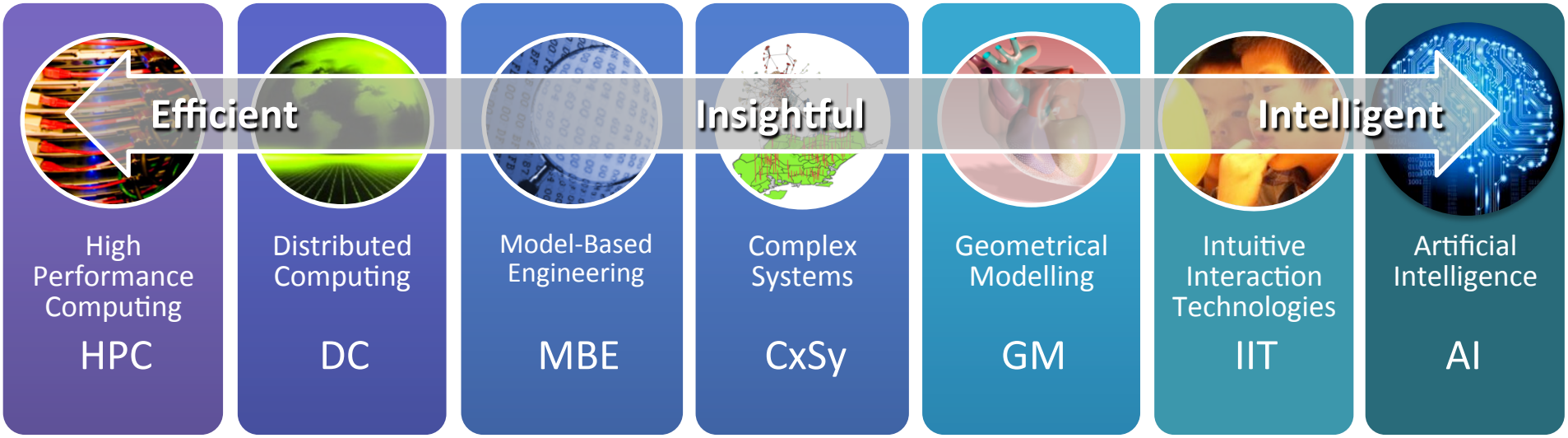
About CS Dept

new computing paradigm

Future of Computing

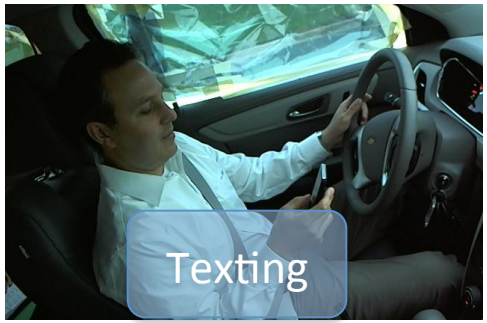
driving scientific and technological research

Develops techniques that draw out the efficiency, insight and intelligence in computing to speed up software codes, scale up computing throughput, provide value and insight into data, provide methods for understanding complex interactions between systems, and create intelligent systems



Computer Science, Engineering, Mathematics, Physics

Deep Learning Project :
Distracted Driver Behaviour Detection



Challenges of current approaches

- Need a lot of training samples (human do not so much data) AlphaGo trained 100m times. Lee played around 50k times.
- Need long training time (human learn much faster)
- Focus more on pattern recognition (human build causal models for understanding, reasoning and planning)
- The models learned cannot be easily generalized for new objects/scenarios (human can do quick generalization for new learning tasks)

How human learn?

- Human learn from infancy by construction of inter-connected causal models gradually to understand and explain the world, predict what if scenarios and plan actions to achieve our goals.
- Human use both model-free (intuition) and model-based learning (reasoning).
- With a few samples, human can generalize knowledge to new tasks and scenarios, which cannot be represented well by current neural network approach.

Possible approaches to achieve human-like learning

- Develop learning systems to link multiple causal models and learn new causal models based on existing casual models.
- Combine model-free (fast) and model-based (flexible/general) approaches.
- Develop learning system such as one-shot learning, which can learn from a few samples based on prior knowledge and also can generalize knowledge to new tasks and scenarios.