



SCENE ACTION MAPS: BEHAVIOURAL MAPS FOR NAVIGATION WITHOUT METRIC INFORMATION



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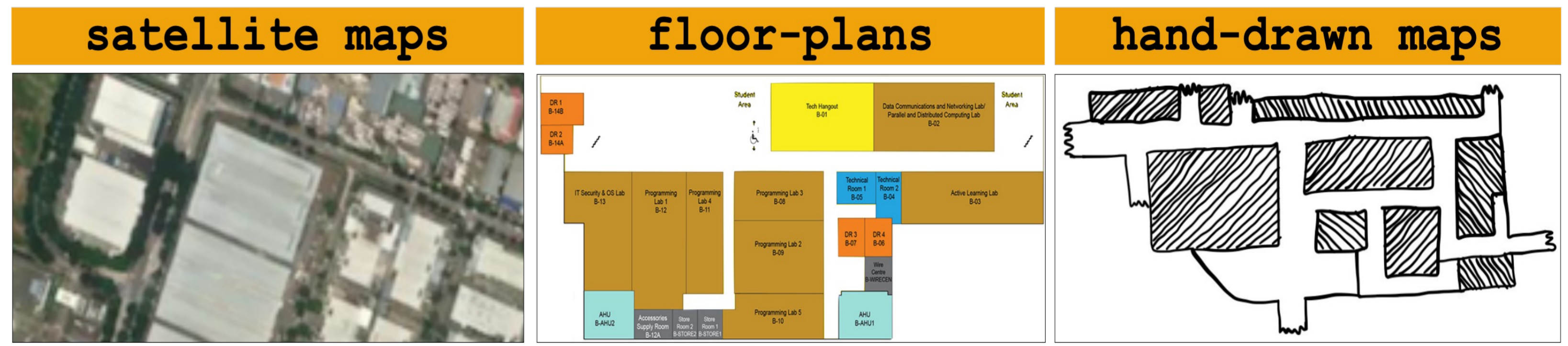
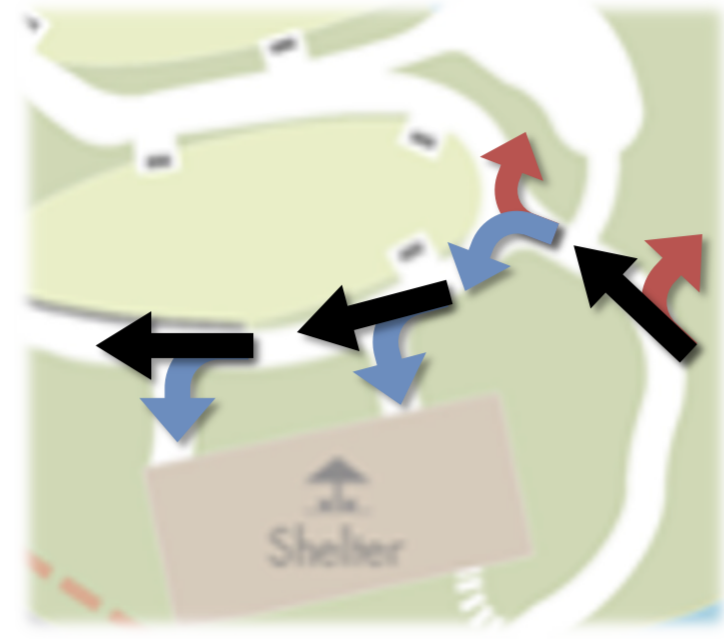
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How can robots navigate with abstract, inaccurate maps and coarse, semantic positioning, like humans?

Hypothesis: By representing and traversing environments with **navigation behaviours**.

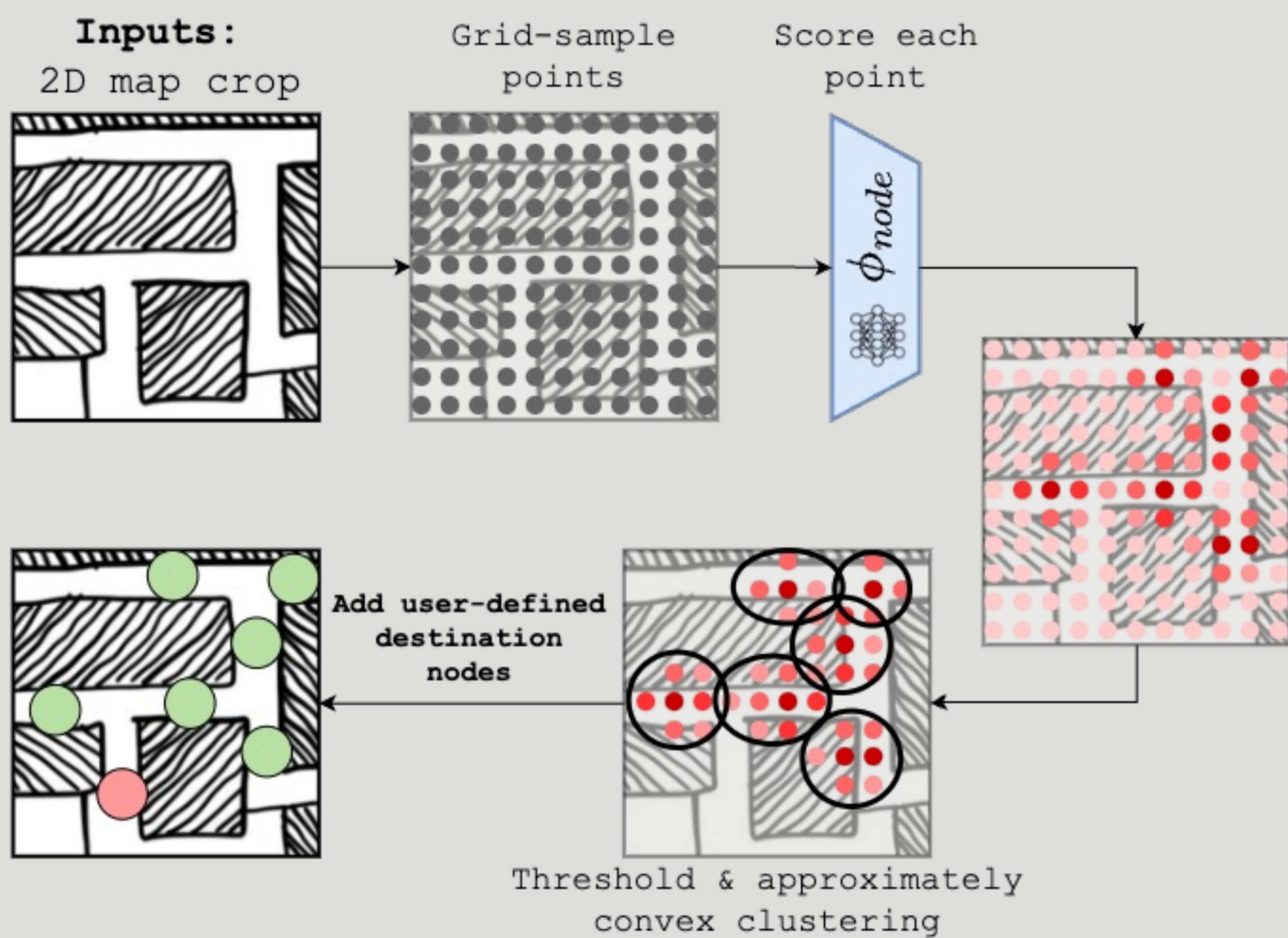
Key idea:

- Abstract maps capture paths as *behaviour sequences*
- Navigate/localise non-metrically with *behaviours/affordance features*

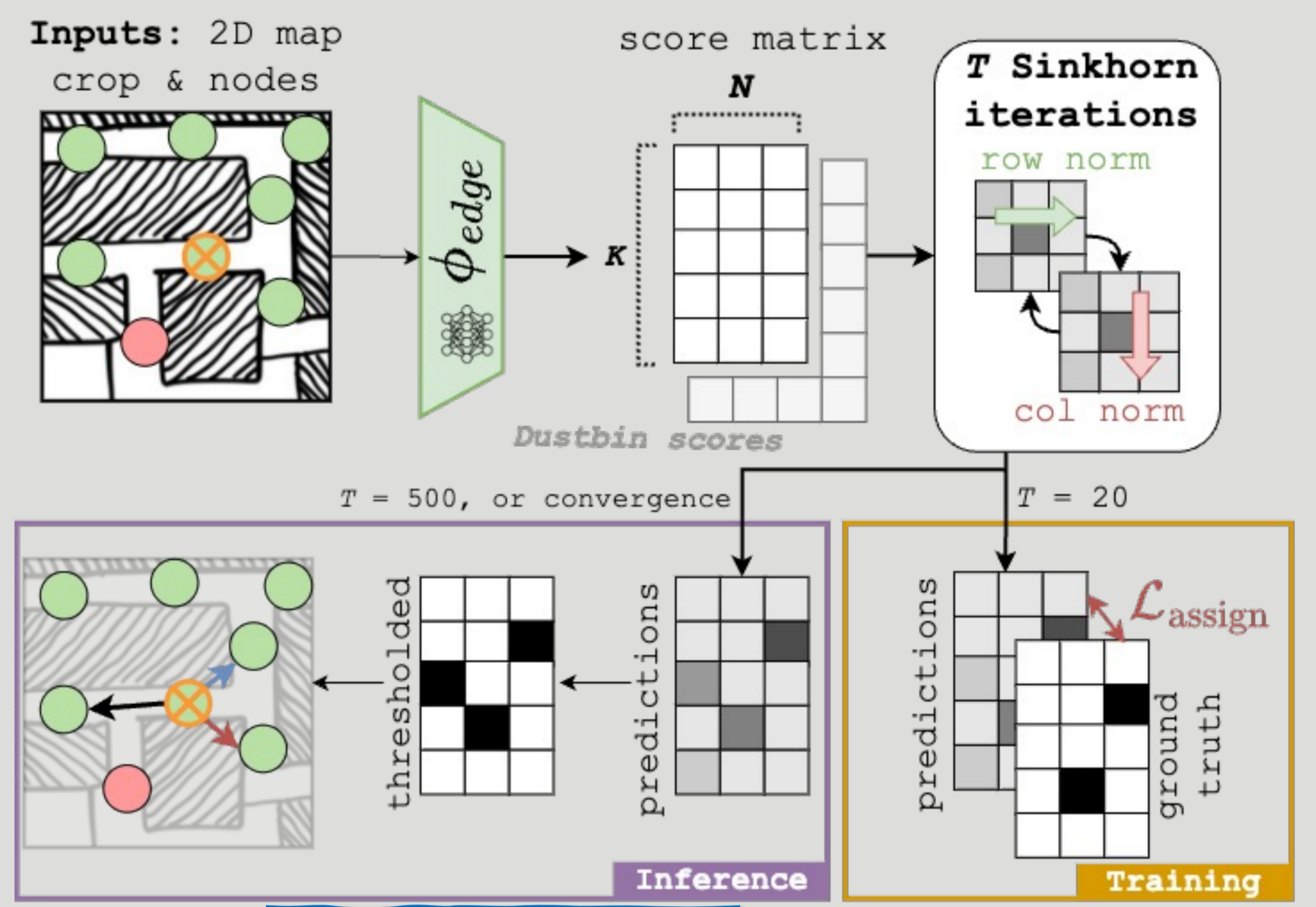


Map-reading: Parsing 2D maps into Scene Action Maps

Node (changepoint) prediction

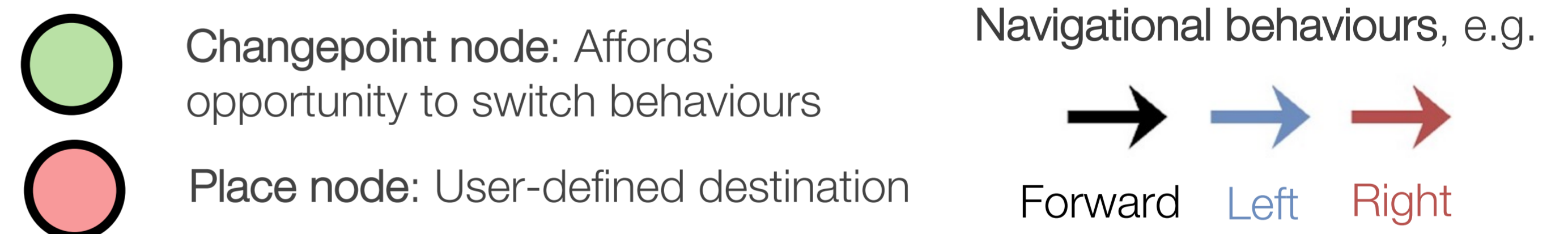


Edge (behaviour) prediction



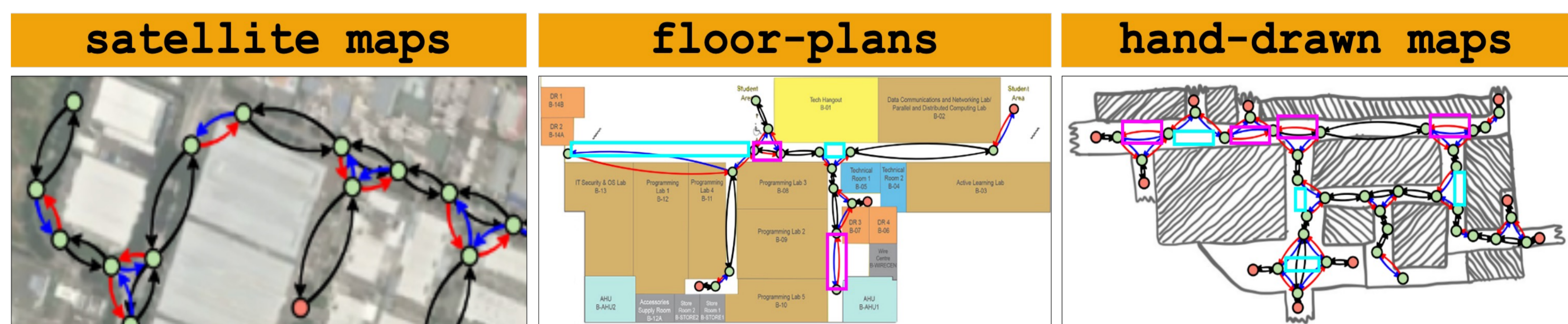
Scene Action Maps

A topological representation of an environment as a **network of behaviours**.

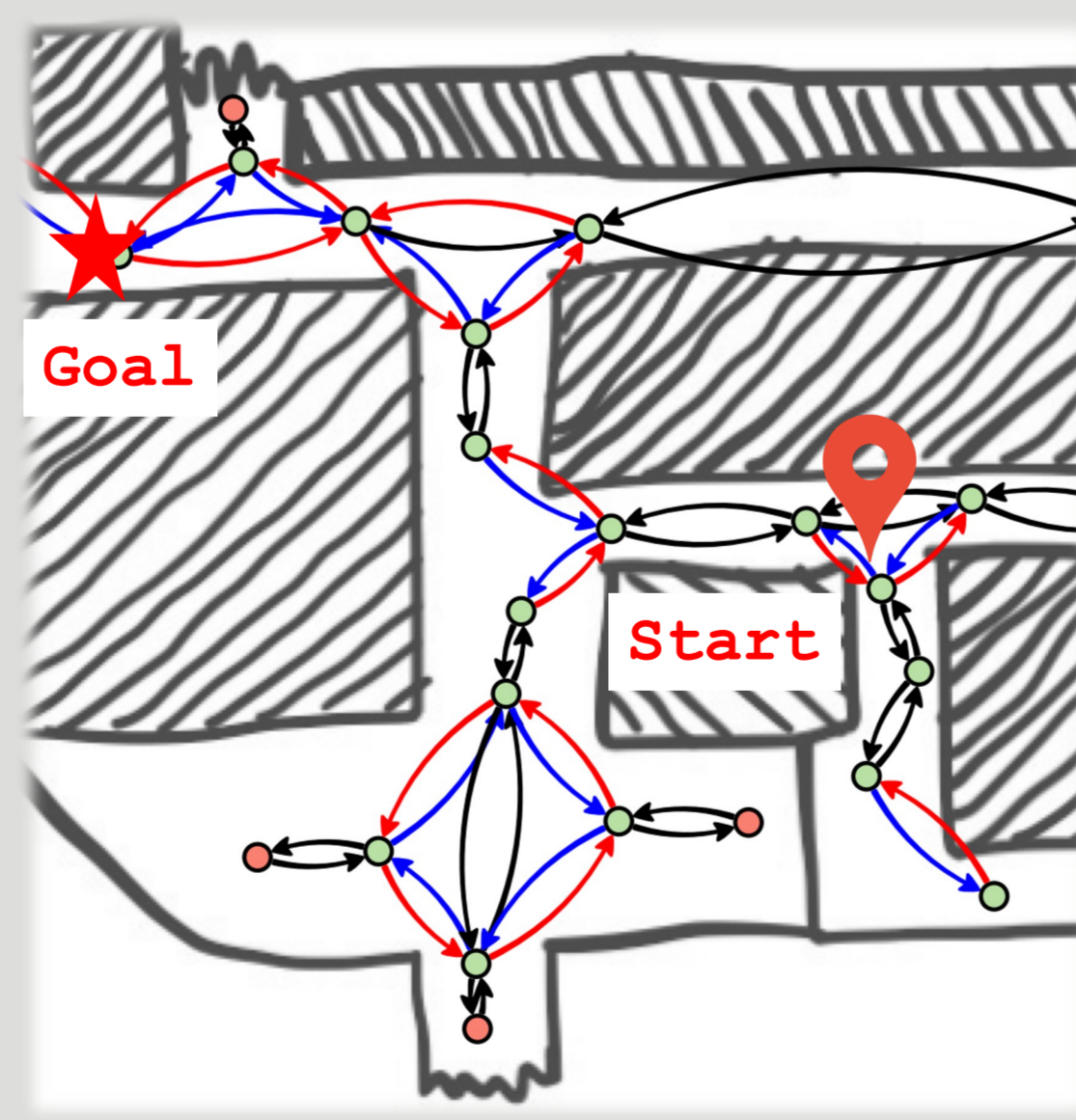
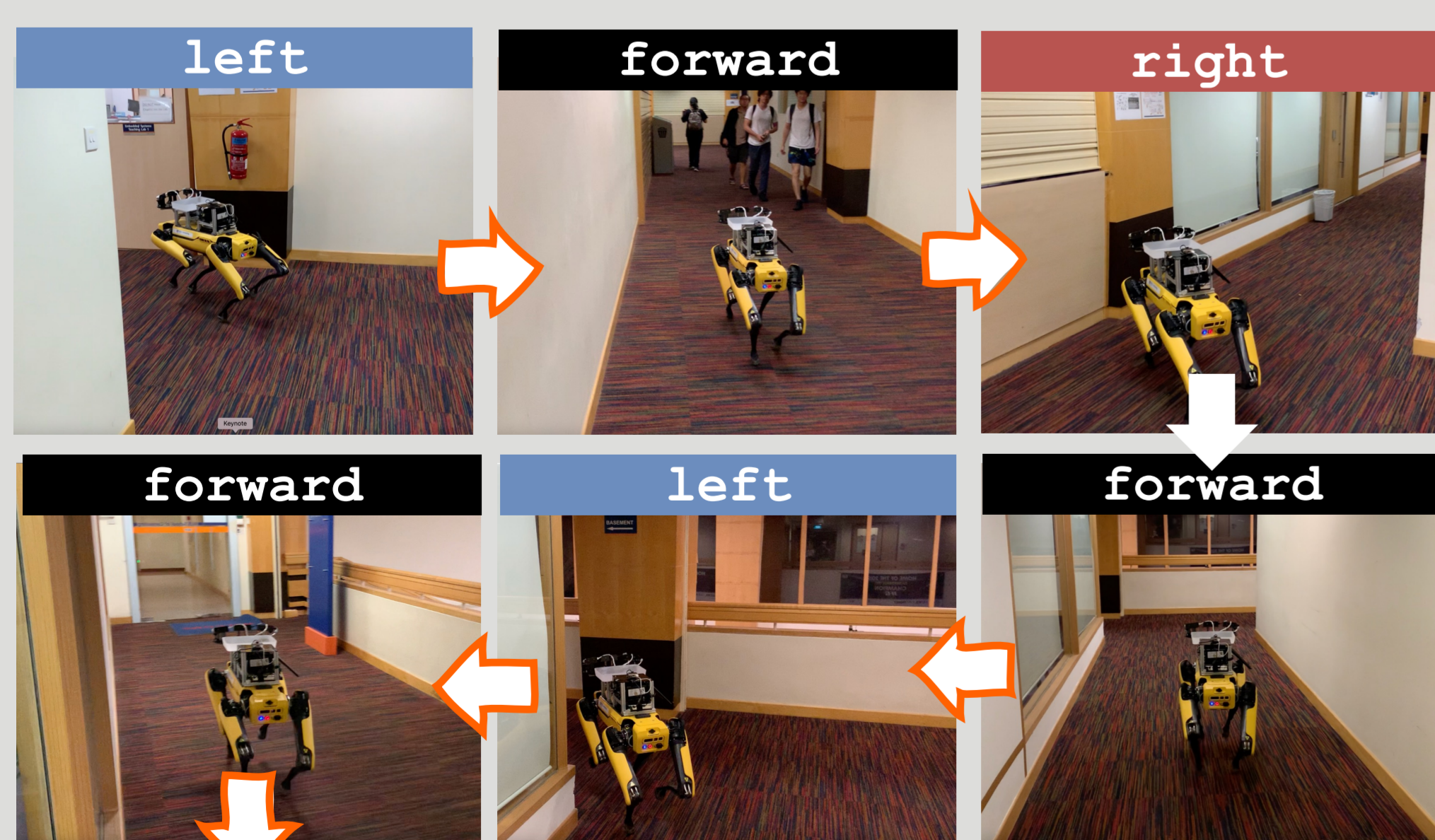


PRECISION AND RECALL OVER VARIOUS 2D MAP TYPES FOR (A) NODE PREDICTION, (B) EDGE PREDICTION ALONE (IGNORING BEHAVIOUR CORRECTNESS), (C) EDGE AND BEHAVIOUR PREDICTION

Tasks	Hand		Flr		SatMap	
	Pr	Re	Pr	Re	Pr	Re
(A)	0.848	0.975	0.732	0.779	0.865	0.621
(B)	0.754	0.605	0.820	0.643	0.863	0.751
(C)	0.667	0.535	0.630	0.494	0.761	0.662

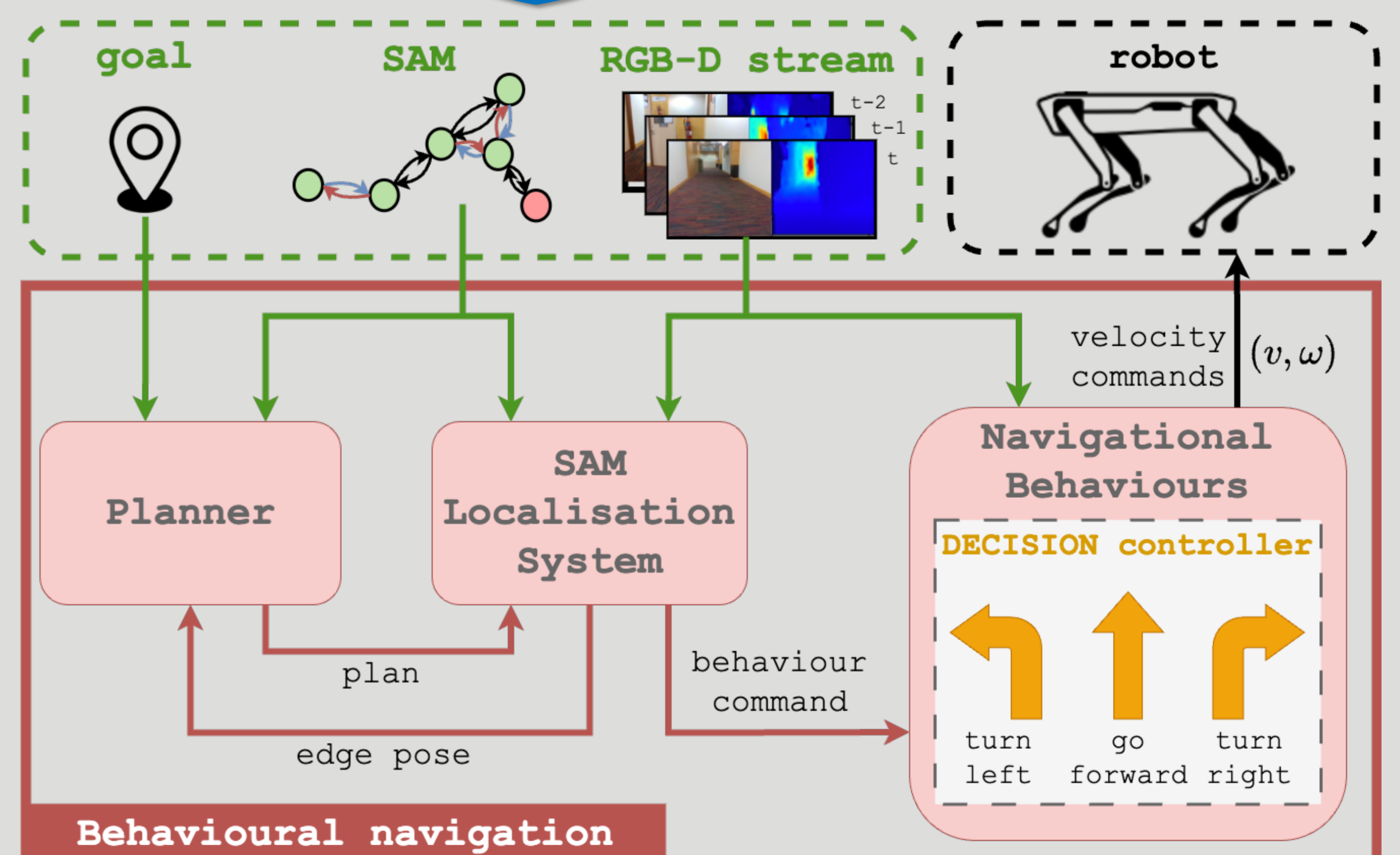


Behavioural navigation: Scene Action Maps for localisation and planning



Real-world navigation with hand-drawn map

SAMs and **navigation behaviours** enable robust non-metric navigation in dynamic indoor environments



SAMs enable navigation without metric information, with abstract, inaccurate prior maps!

