

Learning to Sense Robustly and Act Effectively

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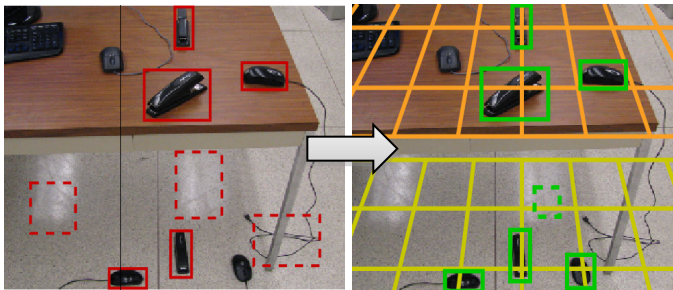
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To cope with a complex world, a CPS needs to learn *its own* knowledge of foundational domains:

- **Space:** Where things are; how to get there.
- **Objects:** What parts of the world have separate state?
- **Actions:** How can the agent affect the state of an object?

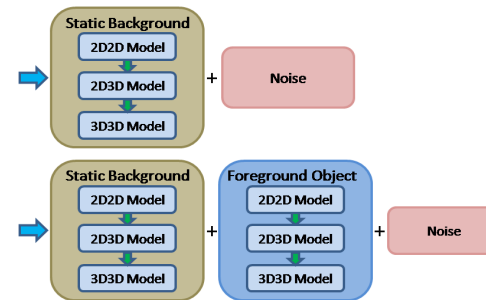
Semantic Constraints in Vision

Joint inference formulation for estimating geometric and semantic properties of the scene from a single un-calibrated image



Learning about Objects

- 2D2D: objects as regions in image
- 2D3D: planar faces with poses in 3D
- 3D3D: 3D object models in 3D



Robot autonomously learns a hierarchy of actions.

