Stochastic Resource Allocation for Decision-Making Support

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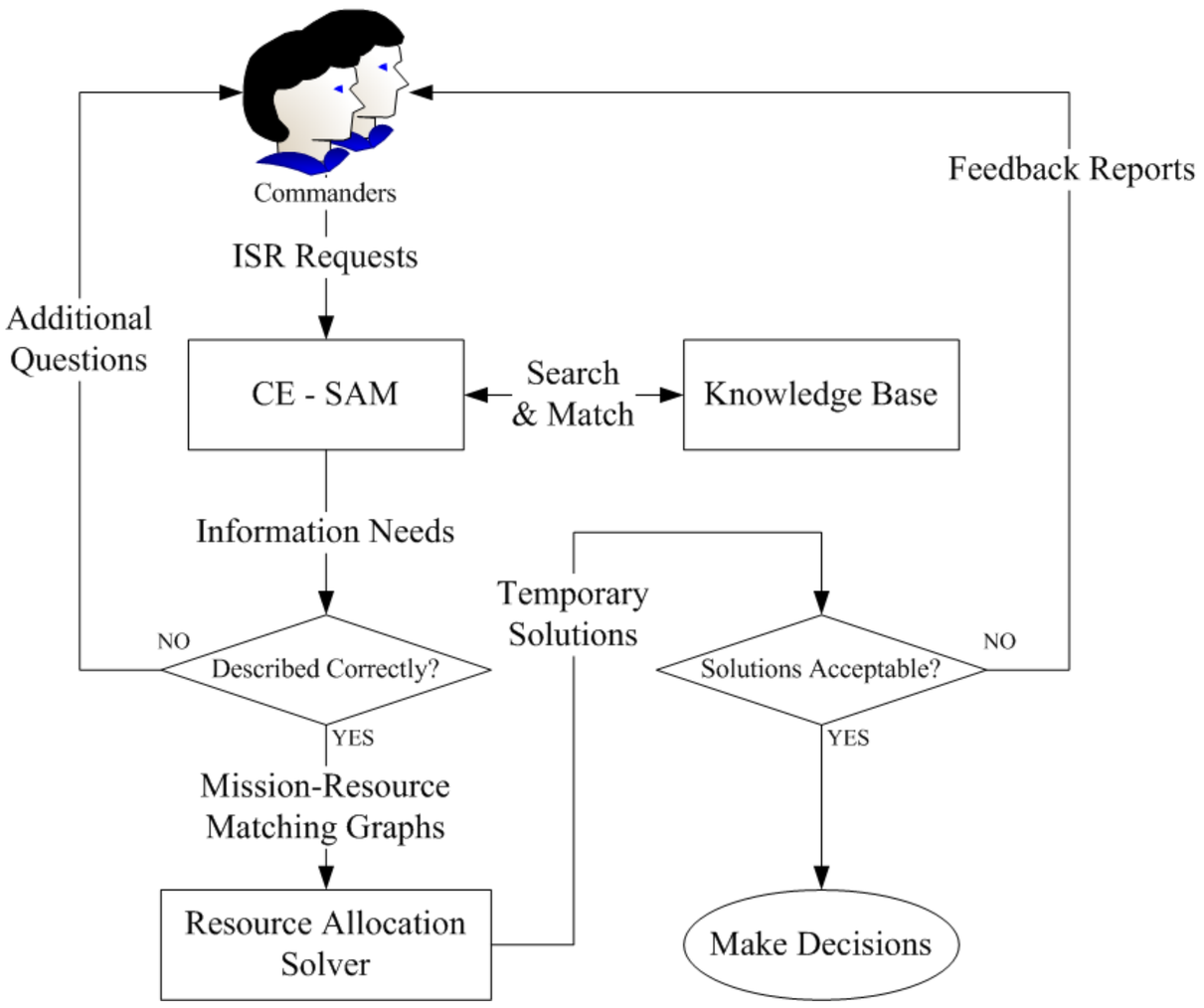
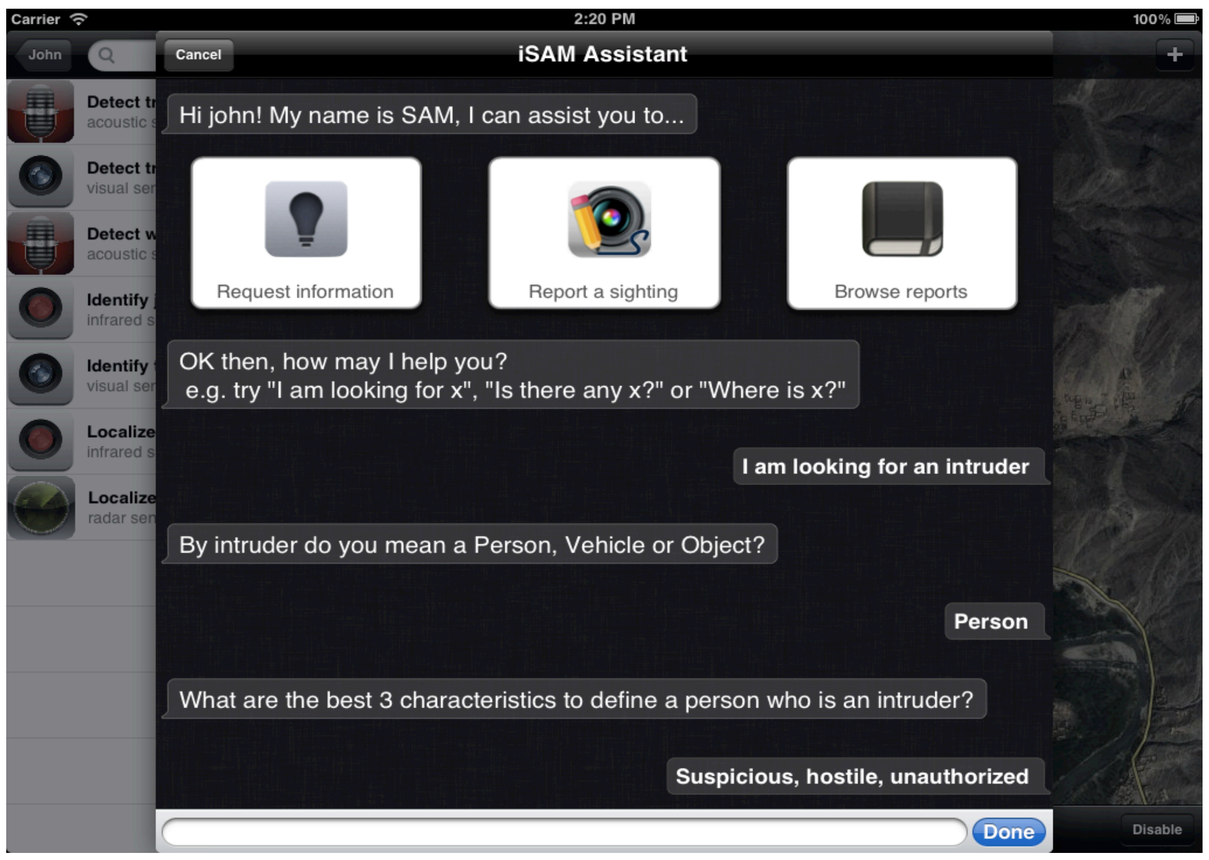
Framework & Work Flows



Human-Machine Interaction

CE-SAM (**C**ontrolled **E**nglish **S**ensor **A**ssignment to **M**issions), as a new interactive interface, is developed to guide the commanders to:

- Build a knowledge base of resource utilities
- Find proper bundles of resources to meet their needs
- Understand current conditions and refine missions



Stochastic Resource Allocation

Needs of resources and achievable profits are assumed to change overtime:

•Missions may execute longer/shorter than expected and consume more/less resources

•Missions may achieve either full or no profit in cases of different conditions

Tunable thresholds are introduced for different criteria:

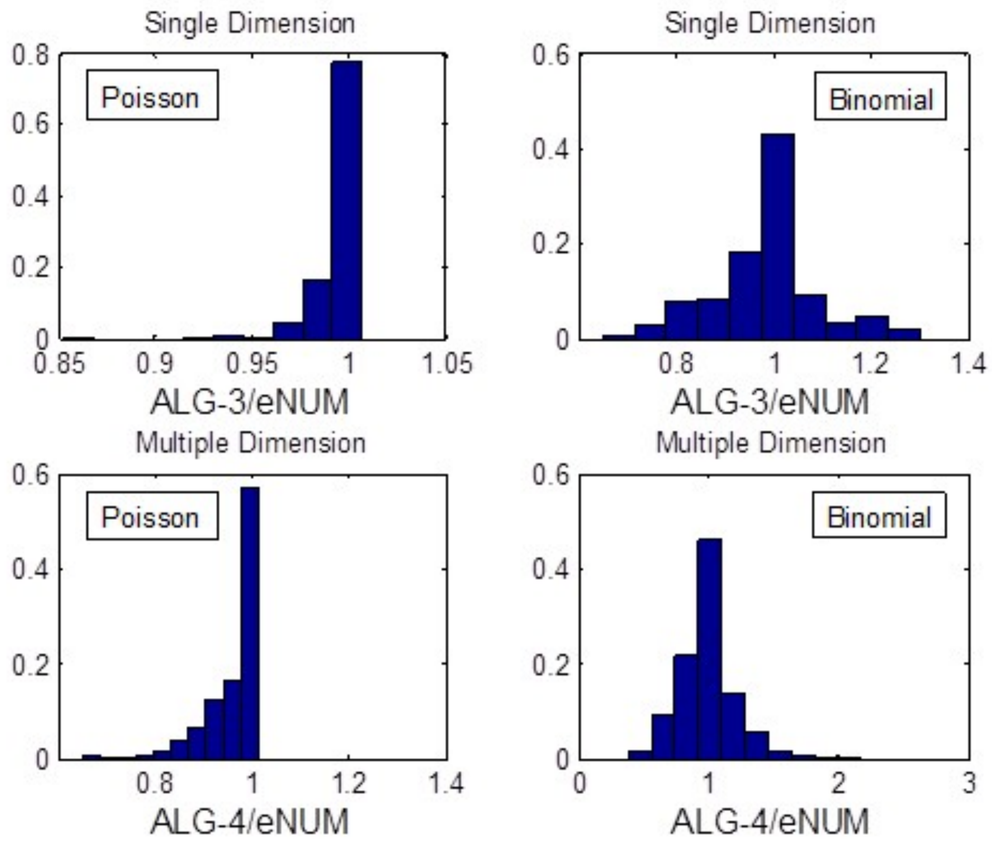
•**p**, as an overflow rate to set the maximum allowable probability on capacity constraint violation

•**q**, as a confidence level to guarantee a lower bound of achievable profit

The problem can be formulated as:

$$\begin{aligned} max \quad & \lambda \\ s.t. \quad & \Pr(\Sigma Needs > Capacity) < p \\ & \Pr(\Sigma Profits \geq \lambda) \geq q \end{aligned}$$

Some experiment results are shown below:



Related Publications

N. Hu et al., "***Resource Allocation with Non-Deterministic demands and profits***", MASS 2013

N. Hu et al., "***A System Architecture for Decision-Making Support on ISR Missions with Stochastic Needs and Profit***", Proceedings of SPIE 2013

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