Learning robots to rescue
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Learning robots to rescue  
*The RoboCup Rescue as training ground*

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**Challenge**
- After a disaster a team of robots, must explore the devastated city. Ambulances have to find as many victims as possible, dig them out and bring them to a hospital. Fire fighters have extinguish fires before the situation goes out of hand. Police can help to patrol and explore, but can also clear the road for the other agents.

**Context**
- After the Great Hanshin Earthquake of 1995 in Kobe, the Japanese government decided to promote research related to the problems encountered during large-scale urban disasters.
- A major outcome of this initiative was the RoboCup Rescue competitions. This lead to both versatile robots as control software for large teams of rescue agents.

**Learning Coordination Policies**

The coordination problem is described as a dec-POMDP, which is interpreted as a series of Bayesian games. In this Bayesian game each robot has some private information (not communicated with the team). This private information is clustered into a type of observation histories. This Bayesian game is used to find a joint policy is designed to maximize the average result achieved on all joint action-observation histories.

**Results**

To apply Bayesian games to realistic RoboCup Rescue scenario’s, the decision making is decomposed into a high-level Bayesian game and low-level MDP:

**Conclusion**

Bayesian Game approximations make it possible to bridge the gap to coordination problems encountered in benchmarks as the RoboCup Rescue. Modeling that each robot has a certain amount of private information, next to a certain amount of common knowledge, is a natural assumption. Also online planning is natural in such dynamic situations.

**References**