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Refereed Article

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A Logical Account of the Common Sense Informatic Situation for a Mobile Robot

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Abstract: *Any model of the world a robot constructs on the basis of its sensor data is necessarily both incomplete, due to the robot's limited window on the world, and uncertain, due to sensor and motor noise. This paper proposes a logic-based framework in which such models are constructed through an abductive process whereby sensor data is explained by hypothesising the existence, locations, and shapes of objects. Symbols appearing in the resulting explanations acquire meaning through the theory, and yet are grounded by the robot's interaction with the world. The proposed framework draws on existing logic-based formalisms for representing action, continuous change, space, and shape, but a novel solution to the frame problem is employed. Noise is treated as a kind of non-determinism, and is dealt with by a consistency-based form of abduction.*

This article has an *appendix* containing additional details for the results reported in it. The appendix is available from the ETAI web page for the article; it has been published and will be preserved like the main part of the article.

Appendices obtain page numbers starting with 1, and outside the page numbering of the ETAI issue.

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Besides the publication and review history, it contains links for contacting the author(s), as well as to amendments and other related information for the article. It is intended to keep these links up-to-date in the future.

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