



Title / Keyword	<input type="text"/>	Journal	Algorithms	Volume	<input type="text"/>
Author	<input type="text"/>	Section	---	Issue	<input type="text"/>
Article Type	all	Special Issue	all	Page	<input type="text"/>

**Algorithms**  
Volume 2, Issue 3

*Algorithms* **2009**, *2*(3), 879-906; doi:10.3390/a2030879

[OPEN ACCESS](#)

Article

## Open Problems in Universal Induction & Intelligence

Marcus Hutter

Research School of Information Sciences and Engineering (RSISE), Australian National University, and Statistical Machine Learning (SML), NICTA, Canberra, ACT, 0200, Australia

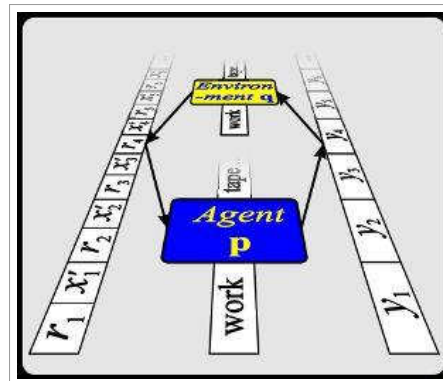
Received: 8 April 2009; in revised form: 15 June 2009 / Accepted: 16 June 2009 / Published: 2 July 2009

(This article belongs to the Special Issue "Algorithmic Complexity in Physics & Embedded Artificial Intelligences"—In Memoriam Ray Solomonoff (1926-2009))

[Download PDF Full-Text \[255 KB, uploaded 8 July 2009 20:55 CET\]](#)

**Abstract:** Specialized intelligent systems can be found everywhere: finger print, handwriting, speech, and face recognition, spam filtering, chess and other game programs, robots, et al. This decade the first presumably complete mathematical theory of artificial intelligence based on universal induction-prediction-decision-action has been proposed. This informationtheoretic approach solidifies the foundations of inductive inference and artificial intelligence. Getting the foundations right usually marks a significant progress and maturing of a field. The theory provides a gold standard and guidance for researchers working on intelligent algorithms. The roots of universal induction have been laid exactly half-a-century ago and the roots of universal intelligence exactly one decade ago. So it is timely to take stock of what has been achieved and what remains to be done. Since there are already good recent surveys, I describe the state-of-the-art only in passing and refer the reader to the literature. This article concentrates on the open problems in universal induction and its extension to universal intelligence.

**Keywords:** Kolmogorov complexity; information theory; sequential decision theory; reinforcement learning; artificial intelligence; universal Solomonoff induction; rational agents



### Article Statistics

[Click here to load and display the download statistics.](#)

### Cite This Article

#### MDPI and ACS Style

Hutter, M. Open Problems in Universal Induction & Intelligence. *Algorithms* **2009**, *2*, 879-906.

#### AMA Style

Hutter M. Open Problems in Universal Induction & Intelligence. *Algorithms*. 2009; 2(3):879-906.

#### Chicago/Turabian Style

Hutter, Marcus. 2009. "Open Problems in Universal Induction & Intelligence." *Algorithms* 2, no. 3: 879-906.

Ads by Google

[Artificial Intelligence](#)  
Ultra Hal - Your digital assistant and companion.  
\$29.99  
[www.zabaware.com](http://www.zabaware.com)