Speculative Machine Learning Projects

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1 Robots for landfill rehabilitation.

Can we use robots, utilizing machine learning, to enter the toxic environment of landfills for the purpose of recycling and rehabilitation? Robots are necessary due to the dangerous environment and machine learning is therefore required for navigation and control.

2 Contemplative Technologies

Contemplative technologies consist of the application of technology to aid in meditation and other techniques for improving human psychological health and well-being. There is great potential to make meditation more efficient and less frustrating through the use of sensor systems and analysis of data from these sensor systems.

3 Question answering system for mathematics

Mathematical communications (journals, books, proofs, etc.) are only semi-formal as they fall short of being true formal languages. Nonetheless, the language of mathematics is far more structured than natural language and this implies it may be possible to create a complete question answering system which would cover the entirety of mathematical knowledge.

4 Machine learning in virtual reality

A completely wide-open topic, machine learning in virtual reality may be far more powerful than in the physical world as we can equip virtual reality with explicit, valuable, ML-digestable information that physical reality lacks.

5 Automatic translation of informal proofs to formal proofs for verification

The success of modern mathematics has a dark side. Increased specialization means fewer experts to check increasingly complicated proofs. Also, the sheer volume of new mathematics means it is virtually impossible to pay adequate attention to all but the smallest slice of the discipline. Formally verified proofs have evolved beyond being a novelty to possibly becoming a requirement for new mathematics in the near future. Voevodsky was motivated by concerns about errors in proofs to explore the proof assistant Coq and formalize a significant portion of mathematics. As a by-product this produced Homotopy Type Theory and the Univalence Axiom. However the development of formal, verifiable proofs is still excessively time consuming. Perhaps it is possible to use machine learning to automatically translate informal (journal style) proofs to formal proofs?