# CALL FOR PAPERS

**Machine Learning Journal Special Issue on**

# Machine Learning for Science and Society

Cynthia Rudin and Kiri L. Wagstaff, guest editors

## Submissions Due: November 16, 2012

In this special issue, we will showcase papers that address problems of importance to science and society. Machine learning and data mining have been used, and will continue to be used, in many important domains that affect people's lives every day; however, it is becoming less common in many mainstream machine learning venues to publish work whose primary goal is to have impact on a new real-world problem. The collection of papers in this special issue will provide an updated answer to "what is machine learning good for?" in which impact is the guiding principle.

For many domains in which machine learning presently makes an impact, it is not necessarily the case that the precise choice of machine learning algorithm is the key factor for success in the domain. Choices relating to problem formulation and data representation sometimes matter far more. Further, there can be several criteria for success beyond predictive performance, including the cost of different errors, domain-specific operational constraints, the interpretability of the system's output, and factors limiting or enabling domain experts to make use of the results. We seek papers that address these issues and present lessons that can benefit the community as a whole.

Papers submitted to this issue may center around:

- A formal knowledge discovery framework for a class of problems, with an application to a particular problem domain
- Specific, novel applications that have not been previously addressed, or not at this scale
- A demonstration of how machine learning can provide a substantive impact to a scientific or social problem, even if no new machine learning algorithm is proposed
- Elucidating the contributions of key components of an algorithm for knowledge discovery, possibly through removing one component of an algorithm or system at a time, grounded in a concrete problem
- A discussion of how to evaluate machine learning algorithms in real contexts
- Means by which machine learning methods can be infused (adopted by domain experts) and in particular, how to communicate with and motivate domain experts to adopt the method.

When preparing manuscripts, authors might find it helpful to consider the full process of knowledge discovery (KDD or CRISP-DM) including business understanding, data understanding, data preparation, modeling, evaluation, and deployment.

*It is strongly encouraged, but not required, to have a relevant domain expert as a co-author.*

Example challenges that affect science and/or society:

- public safety
- medical data mining and public health (improved patient care, medical imaging, medical fraud detection, etc.)
- education and infrastructure in the developing world
- sustainability and the environment (ecology, smart grids, etc.)
- infrastructure for communications and the internet
- manufacturing
- transportation
- commerce and e-commerce
- crime and fraud
- space exploration

Papers submitted to this special edition must be scientific, in that they must contain a message that is potentially useful to future practitioners, as opposed to simply reporting an anecdotal experience. Papers that only describe a domain by which they are motivated, then present an empirical comparison ("bake-off") or a new algorithm as the main result, are likely to be rejected without review. Submissions about domains for which there is already a well-established and long-standing mechanism for success through machine learning are less likely to be accepted.

## Submission Guidelines

The papers for this special edition should be short papers, approximately 8-12 pages in length. Authors should submit high-quality, original work that has neither appeared in, nor is under consideration by, other journals. We aim for a fast turnaround time for reviews to get decisions out quickly (see the timeline below).

Submissions to the special issue must be submitted like regular submissions to the journal. **Please select the article type "SI: ML for Science and Society" when submitting your paper.** Instructions can be found here

We prefer papers that are structured as follows:

- **Problem of Interest:** Introduce the scientific or social problem. Why does it matter? Whom does it impact? What is the need? What are the limitations of current solutions to the problem? Be quantitative where possible.
- **Data Preparation:** Describe the data provided by the originating domain. How did you decide what features to use? What (reproducible) steps did you have to employ to make the data usable for machine learning? What new insights did you gain about the domain or problem as part of this process?
- **Machine Learning Technique:** Describe the ML approach used to solve this problem. Provide enough detail for a machine learning audience to understand the method, but do not make this the centerpiece of your paper.
- **Empirical Results:** Describe and justify your chosen methodology. Include comparisons with appropriate baselines and simple methods. In addition to common evaluation metrics such as accuracy or false positive rate, define and employ metrics of relevance to the problem domain. How does the domain measure success?

The paper **MUST** include a careful discussion of the results and what the implications are for the problem of interest. Papers that simply present a table of results or a "bake-off" without this analysis may be rejected without review.

- **Expert Commentary (optional but highly encouraged):** Provide a domain expert's analysis of the results and their actual or potential impact to the domain. The expert may or may not be involved in the project effort.
- **Potential (or Actual) Infusion:** Include a description of how the approach, or its output (predictions) is being used, or can be used, domain experts. What is the path to achieving real impact?
- **Lessons for the ML Community:** What general lessons can the research community draw from this result? Be explicit.

If you are considering submitting to the special issue and have questions regarding the scope or need further information, please do not hesitate to contact the editors:

Cynthia Rudin and Kiri L. Wagstaff, mlj-at-mlimpact.com

Administrative notes:

- Authors retain the copyrights to their papers.
- Submissions and reviewing will be handled electronically using standard procedures for Machine Learning.
- Authors must register with the system before they can submit their manuscripts.
- Authors must select the appropriate Article Type -- SI: ML for Science and Society -- when submitting their manuscripts.
- Accepted papers will be published electronically and citable immediately (before the print version appears).

## Schedule

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| Submit title+abstract (by email): | November 12, 2012 |
| Submission deadline: | November 16, 2012 |
| Early submissions are welcomed and will receive an earlier review and response. | |
| Decisions (estimated): | December 21, 2012 |
| Revisions due: | January 11, 2013 |
| Decisions (estimated): | February 10, 2013 |
| Final version due: | March 1, 2013 |
| Special issue published: | Summer or fall of 2013 |

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