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Discovering gravitational lenses with artificial intelligence

Petrillo, Enrico

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PROPOSITIONS

accompanying the dissertation

DISCOVERING GRAVITATIONAL LENSES WITH ARTIFICIAL INTELLIGENCE

1. The morphology of strong gravitational lenses relates to their fundamental physical properties. This makes them perfect for exploitation with modern pattern recognition algorithms such as Convolutional Neural Networks. (Chapters 2, 3, 4)
2. The success of identifying gravitational lenses using Convolutional Neural Networks crucially depends on a careful composition of the training set of observed data and on the creation of high quality synthetic examples. (Chapter 3)
3. Convolutional Neural Networks can identify orders of magnitude more gravitational lenses than currently known in upcoming astronomical surveys with minimal human effort. (Chapter 4)
4. The newly-discovered gravitational lenses from KiDS will shed light on the structure and composition of galaxies and on the nature of space-time. (Chapters 2, 4)
5. Even if Science is always right, Research is often wrong.
6. Despite the efforts that have been put into creating a collaborative community, the academic world remains an ideal environment for prima donnas.
7. The publish-or-perish paradigm encourages the development of science miners rather than science navigators.
8. Healing and self-knowledge can be found in practices that are often condemned, distorted and underestimated.
9. Getting rid of our cognitive biases may require more than a lifetime but is the only way to create an aware society which can choose for its own good.
10. In exchange for a salary, many jobs take away the time which is needed to develop ourselves to become better humans.
11. The loss of belief in a divine meaning underlying the human condition gives us the opportunity, the urge and the responsibility to create the best possible meaning.
12. We have allowed progress to run unleashed in the field of the free market. An advanced society must eventually drive its own progress.
13. The Known, the Knowable and the Unknowable are three sides of the same phenomenon: the miracle of existence that, too often, we forget to celebrate.

Carlo Enrico Petrillo