

The Hydra Shiva Concept for GEM and Benchmarking

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Outline

- **Motivation and Background**
- **Gardening**
- **Hydra Shiva**
- **Pareto-like approach to adaptation**

Motivation & Background

- Why do we need GEM for Robotics? Fabio tells us:
 - To make robotics a serious science
 - To gain order in experimental robotics (increase quality)
 - But I am not happy with this answer to the WHY !
- **Is Robotics Science?** Will it ever be?
- Is Computer-Science science?
- Is the design and testing of cars science ?
- Can robotics be engineering and science at the same time?
- How do we define science?

Motivation & Background

- "Scientists **discover** the world that exists; engineers create the world that never was"
- Theodore von Kármán
- What is meant by **discover**? Is testing cars science?
- Possible definitions of science:
 - Specific field of knowledge gained by systematic research about nature
 - Specific field of knowledge gained by systematic research
- Discover knowledge, Discover laws (replicate)

Motivation & Background

- We test a car to get knowledge about the particular car (e.g., what was the reason for the annoying noise). We do not test it to gain general knowledge about cars.
- In robotics we test specific systems with a community goal to get general knowledge from the bits an pieces.
- Hence, IMHO, robotics can be considered science by the second definition:
- Robotics is a specific field of knowledge gained by systematic research. Yet we can do better:
- Raise robotics from science to serious science

FABIO....

Motivation & Background

- We have an answer on the WHY GEM
 - To gain general knowledge
- The next main questions
 - **What should we be experimenting with?**
 - How should we experiment?
- What constitutes general knowledge in robotics?
- Should experiments with a **particular platform** be considered as a general knowledge?
- How do we avoid the context (environment, tasks, platform), and achieve a general knowledge?

Motivation & Background

- **Is Benchmarking significance to Robotics as Science or as a Technology?**
- Benchmarking provides general knowledge when robots achieved a certain required task that originally looked unclear.
- So benchmarking might be considered as a part of the Science of Robotics

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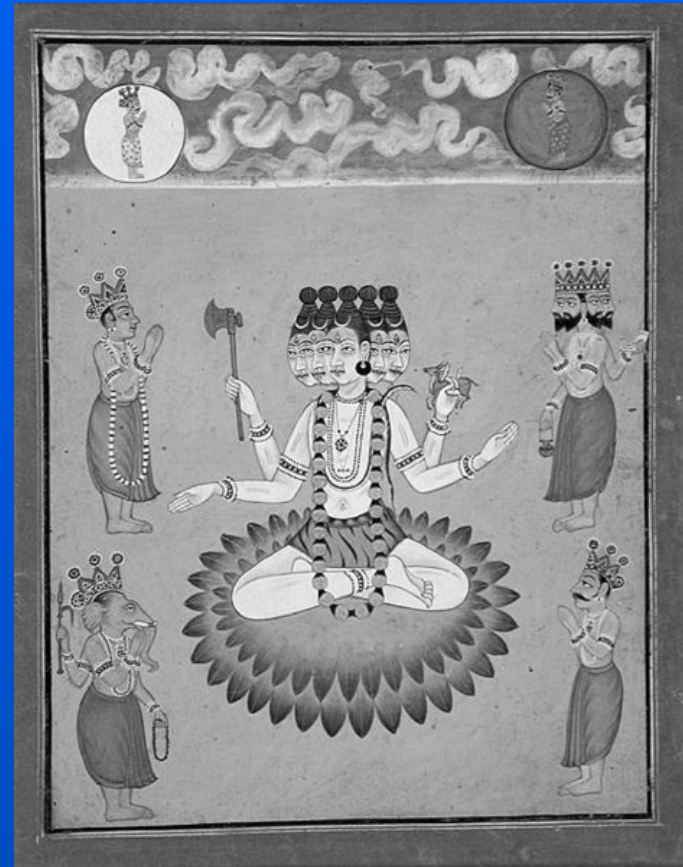
Gardening

- **A generic scenario**
- **Change by geography and owner preferences**
- **Various objects, light conditions, forces, etc**
- **Different from Agriculture**

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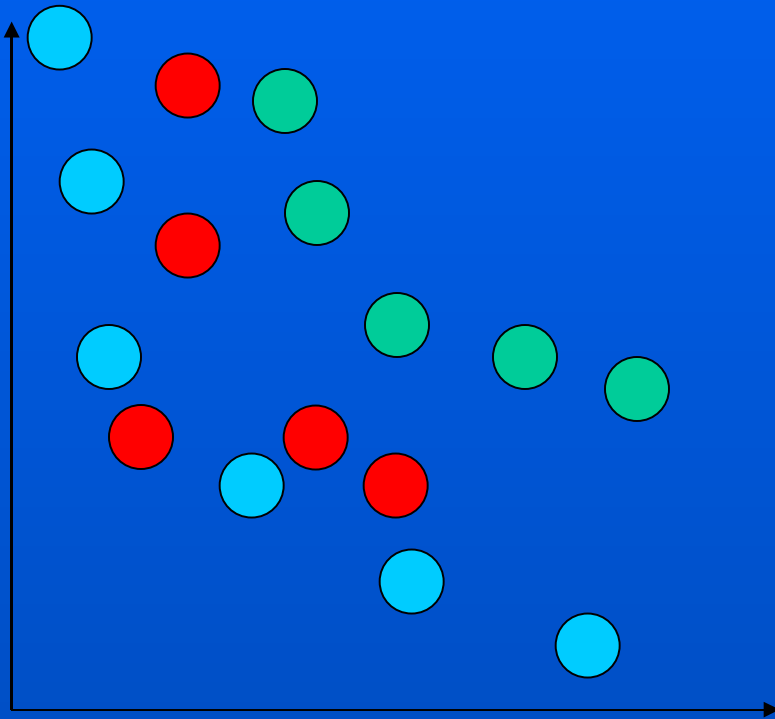
Hydra Shiva Concept



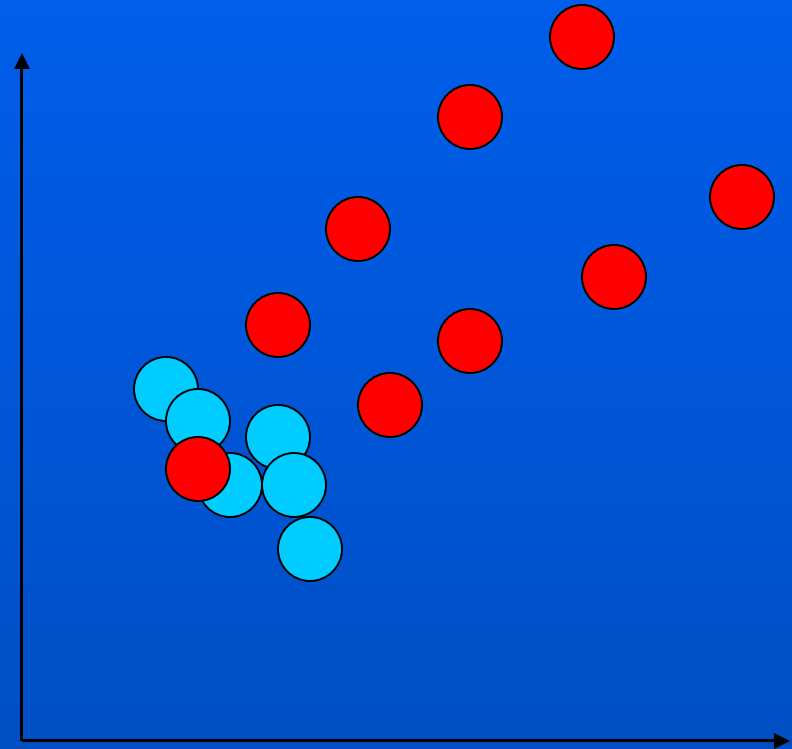
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Comparing Solutions & Sets in MOPs



Pareto Directed



Goal Directed

Conclusions

- **No Conclusions !!**
- **I don't like to Teach I like to Inspire !!**
- **Go Home and Think !!**