Waifu Models: An AI That can have Wet Dreams while Sleeping

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Stuff (delete later)

⋆ *The idea behind model-based reinforcement learning is that modeling the entire environment can be a shortcut to learn faster good policies, where with faster we mean with less actual real world simulations. This idea is extensively and nicely presented in the paper World Models. With this project, you will study World Models and: 1) report on the main ideas behind model based RL with respect to standard RL; 2) test experimentally the performance of model based RL on a new environment, for instance one of the OpenAI PROCGEN games; and 3) discuss the pros and cons of model-based RL and possible evolutions of this paradigm (to the best of your investigation).*

⋆ *Continuous action space considerations.*

1. Introduction

1.1. Core concepts of model-based RL

1.2. Difference with standard RL

2. Related work

(Moerland et al., 2021)

3. Proposed method

4. Experimental results

5. Conclusions

5.1. Benefits and drawbacks of model-based RL

⋆ Advantages of model-based RL:

- *Data efficiency*:
- *Exploration*:
- *Stability* (da capire)
- *Transfer*:
- *Safety*:
- *Explainability*:

⋆ Disadvantages:

- *Additional computation and memory usage*:
- *Lots of hyperparameters*:
- *Stability*: qua va visto bene perchè in 5.1 lo dava come pro.

5.2. Challenges and possible evolutions

Project submission

Once you have finished your project, you are required to submit a report using this template. In principle, the only files you need to modify are "main.tex" and "bibliography.tex" (see Section 5.2 for more details). Hence, you can simply take this document and modify it directly with your own content.

Limits. The report must have at most 2 pages, without counting the bibliography, which can go to page 3. If you did your project with another student, then your budget is extended to at most 3 pages plus bibliography.

Code. Submitting your code is part of the exam. It need not be public (although we encourage it), but at least we must be able to access it for proper evaluation. One possibility is to put your code on a github repository. Please link the code directly from the report, example link: `https://github.com/erodola/DLAI-s2-2021`.

Report structure

There is no mandatory structure to adopt, but a typical report should look as follows. 1) An **introduction** section where the problem is presented, and the overall proposed approach is briefly described; 2) a **related work** section; 3) a **method** section, where the main methodology used for the project is described; 4) experimental **results** (qualitative, quantitative, or both); 5) **discussion and conclusions**.

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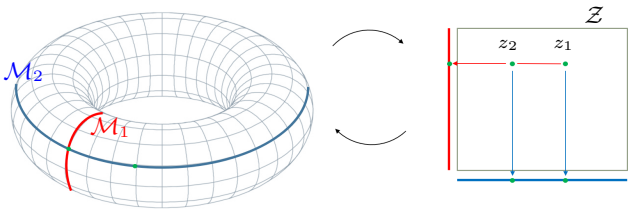

Figure 1. In the figure caption, you can write what you want including formulas, e.g. $\mathcal{X} \subset \mathbb{R}^3$. Notice that in this figure, we added mathematical symbols on top of the image by using the overpic command.

Using LaTeX

If this is your first time using LaTeX, here are a few common instructions that you may find useful. Please read this while looking at the source code.

Formulas. You can write formulas inline, such as x^2, or you can put them in their own environment, for example:

$$\lambda_i = \int_{\mathcal{X}} \langle \nabla \phi_i(x), \nabla \phi_i(x) \rangle dx \,. \tag{1}$$

You can also refer to formulas without having to write their equation number by hand, such as Equation (1).

Figures. You can and are encouraged to include figures. See an example with Figure 1.

Table. Tables can be used to report quantitative results, here is one random example:

Table 1. Performance comparison.

#factors	β VAE	DCI Dis.	MIG	MIG-PCA	MIG-KM
One	100%	**99.0%**	63.7%	73.5%	69.2%
Variable	98.9%	94.9%	62.3%	70.5%	**66.9%**

Bibliography. This is an example bibliographic reference (Ha & Schmidhuber, 2018). If you want to add more, you must edit the file "references.bib".

References

Ha, D. and Schmidhuber, J. World models. Mar 2018. doi: 10.5281/zenodo.1207631.

Moerland, T. M., Broekens, J., and Jonker, C. M. Model-based reinforcement learning: A survey, 2021.