

Advanced Topics in Deep Reinforcement Learning

Introduction



Knowledge Goals:

- Overview of current RL, MetaRL & AutoRL research landscape
- Modelling real-world problems as RL tasks
- Challenges of different RL paradigms
- Best empirical practices for RL

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Skill Goals:

- Find, read and discuss current research
- Synthesize new solutions from the literature
- Present and iterate on own ideas
- Implement state-of-the-art RL algorithms

RL Task Settings

Offline RL

Multi-Agent RL

Continual RL

RL Task Settings

Offline RL

Learning from transition datasets instead of interaction

Multi-Agent RL

Multiple agents learning together

Continual RL

Learning in an ever changing task

RL Task Settings

Offline RL

Multi-Agent RL

Continual RL

RL Solution Methods

RL Task Settings

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RL Solution Methods

Algorithms

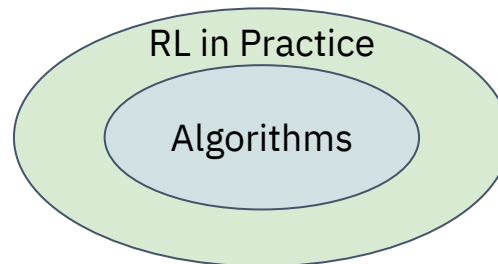
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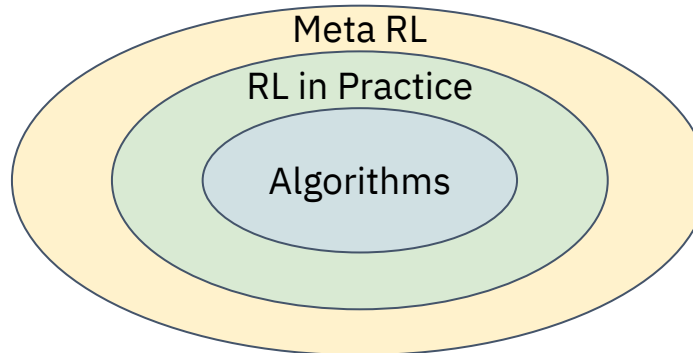
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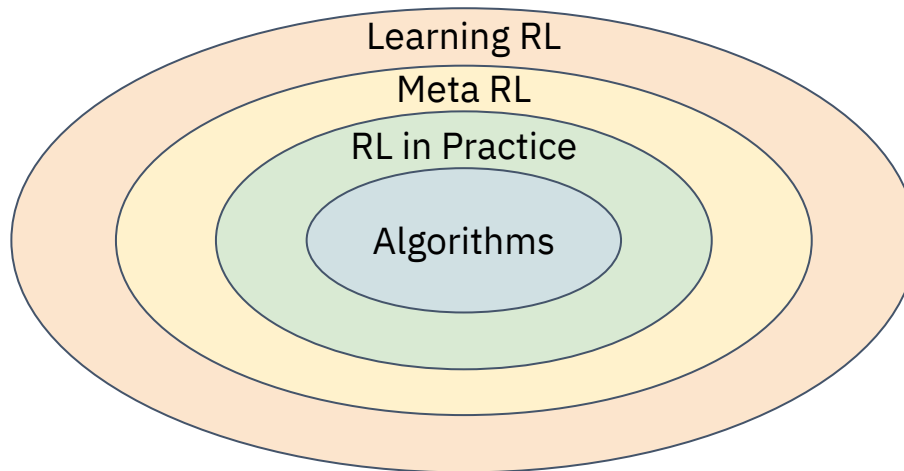
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Course Structure

Two classes per week:

1. Lecture: *Learning about a new topic*
2. Seminar: *Working with the new topic*

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1. Lecture: *Learning about a new topic*
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2. Seminar: *Working with the new topic*
 - 2 slide pitches of an idea on how to apply the topic to one of our target domains
 - Joint discussion on promising directions

What Is a 2 Slide Pitch?

- 2 slides / 2 minutes to present an idea:
 - **empirical results:** *applying a method to our target domains*
 - **method sketch:** *plan on how to adapt a method to our target domains*
 - **challenge thoughts:** *showing issues/challenges in applying the current topic to our target domains*

What Is a 2 Slide Pitch?

- 2 slides / 2 minutes to present an idea
- Focus on one kind of idea and one target domain
- Informal, no need for elaborate slide design
- Goal: hear different perspectives and find best new directions

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- You write a research proposal during the semester and can use all results and materials from your pitches:
 - *Motivation*
 - *Related Work*
 - *Preliminary results on our domains*
 - *Draft of project progression (e.g. future experiments)*
 - *Suggested grade based on our grading standards*

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- You present this proposal during the exam and will answer questions
- The second part of the exam will be about the lecture content

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- You write a research proposal during the semester and can use all results and materials from your pitches
- You present this proposal during the exam and will answer questions
- The second part of the exam will be about the lecture content
- Grading:
 - 50% proposal, 50% Q&A
 - We use your proposed grade if there are no significant disagreements (i.e. difference of a full grade or more)

Where Can I Find Important Information?

- All lecture PDFs & infos will be on StudIP
- [Course page](#) has all the important information as well
- Environments & code samples on [GitHub](#)
- When in doubt, ask:
 - In the lecture
 - Via e-mail: t.eimer@ai.uni-hannover.de
 - In my office hour (book slot [here](#))