BACHELOR'S THESIS ASSIGNMENT

I. Personal and study details

Student's name: **Rada Jakub** Personal ID number: **492291**

Faculty / Institute: **Faculty of Electrical Engineering**

Department / Institute: **Department of Cybernetics**

Study program: **Open Informatics**

Specialisation: **Artificial Intelligence and Computer Science**

II. Bachelor's thesis details

Bachelor's thesis title in English:

Comparing Exploration Methods in Partially Observable Stochastic Games

Bachelor's thesis title in Czech:

Porovnání metod explorace v částečně pozorovatelných stochastických hrách

Guidelines:

HSVI algorithm for solving subclasses of partially observable stochastic games approximates the value function of the game using a lower bound and an upper bound value function. Every iteration of the algorithm, the point-based Bellman-style updates are performed over these two approximate value functions. In HSVI, the belief points for the updates are selected based on the strategies of the players and the gap between the lower and upper bound. This heuristic however does not have to be the optimal method for exploring the space of belief points in POSGs. The goal of the student is to:
1. Get familiar with the algorithm HSVI for POSGs.
2. Survey the existing methods for solving exploration-exploitation problem in game-theoretic settings.
3. Select a subset of appropriate methods from the previous step and implement them as belief-points selection methods into the HSVI.
4. Compare these methods and analyze the impact of these different exploration techniques on the effectivity with which the space of the belief points is explored in POSGs.

Bibliography / sources:

[1] Horák, K., Bošanský, B., & Pěchouček, M. (2017). Heuristic Search Value Iteration for One-Sided Partially Observable Stochastic Games. In AAAI (pp. 558-564).
[2] Slivkins, Aleksandrs. "Introduction to multi-armed bandits." arXiv preprint arXiv:1904.07272 (2019).

Name and workplace of bachelor's thesis supervisor:

doc. Mgr. Branislav Bošanský, Ph.D. Artificial Intelligence Center FEE

Name and workplace of second bachelor's thesis supervisor or consultant:

Date of bachelor's thesis assignment: **08.01.2022** Deadline for bachelor thesis submission: **20.05.2022**

Assignment valid until: **30.09.2023**

doc. Mgr. Branislav Bošanský, Ph.D. Supervisor's signature	prof. Ing. Tomáš Svoboda, Ph.D. Head of department's signature	prof. Mgr. Petr Páta, Ph.D. Dean's signature

III. Assignment receipt

The student acknowledges that the bachelor's thesis is an individual work. The student must produce his thesis without the assistance of others, with the exception of provided consultations. Within the bachelor's thesis, the author must state the names of consultants and include a list of references.

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Date of assignment receipt

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Student's signature