

Kurs in Phase I des Promotionsstudiums (5 ECTS)

Vorlesung

WiSe2016/17

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Introduction to the Computational Complexity Theory

The aim of the course is to give a detailed introduction to the computational complexity theory. The discussion begins with a description of the main goals of the theory and basic notions such as languages (language is just a set of words in our case), Turing machines (simplest mechanisms for the transformation of words and a formal representative of the notion of algorithm) and classes P and NP (as sets of languages).

Another important subject is the notion of reducibility. An explanation of this notion is given for both problems and languages. Then we discuss the formal definition of the polynomial reduction of languages, introduce the definition of NP-complete language and consider the central open question of the complexity theory about coincidence or non-coincidence of classes P and NP .

Though the notion of NP-completeness is introduced for languages, it can be extended to mathematical decision problems. We explain the importance of identifying NP-completeness of a problem.

The necessary propositions are given (without proofs) and some examples of proving the NP-completeness of problems are presented.

We proceed with the expansion of the hardness notion to optimization problems by introducing the notion of NP-hard problem. We present a standard scheme for proving the NP-hardness of discrete optimization problems and discuss the conditions of its applicability. Besides, we give an alternative scheme for proving the NP-hardness of discrete optimization problems that can work in situations where the standard scheme fails.

Zeiten:

Fr. 18.11.2016, 10:15 – 12:30 Uhr, 14:15 – 16:30 Uhr

Mo. 21.11.2016, 10:15 – 12:30 Uhr, 14:15 – 15:45 Uhr

Mo. 28.11.2016, 10:15 – 12:30 Uhr, 14:15 – 15:45 Uhr

Fr. 2.12.2016, 10:15 – 12:30 Uhr, 14:15 – 16:30 Uhr

Mo. 5.12.2016, 10:15 – 12:30 Uhr, 14:15 – 16:30 Uhr

Raum: US-D- 307 (Gebäude LWH)