シラバス参照

<<Last Updated:2021/02/28>>

Course Schedule Information

Course Code	331325
Semester	Spring and Summer Term
Day and Period	Wed4
Course Name (Japanese)	コンピュータサイエンス基礎論
Room	Graduate School of Information Science and Technology/B101
Course Name	Fundamentals of Computer Science
Capacity	100
Course Numbering Code	33BIEN5M007,33INPS5M007,33COSC5M007,33INSE5M007,33INNE5M007,33MUEN5M007
Credits	2.0
Student Year	1,2
Instructor	All Staff,Yuta Nakashima,Tomoya Nakamura,IZUMI Taisuke,Fumihiko Ino,NAGAHARA Hajime,MAKIHARA Yasushi,Yoshiki Higo,Masao Okita,TAKEMURA Noriko,Katsuro Inoue,Yasushi Yagi,Shinji Kusumoto,Makoto Matsushita,Toshimitsu Masuzawa,Shinsuke Matsumoto

Detailed Syllabus Information

Course Name	Fundamentals of Computer Science
Language of the Course	English
Type of Class	Lecture Subject
Course Objective	In order to study evolutive topics in computer science area, this course addresses the fundamental techniques (ex. mathematics, concept of computer system) used in the area. Computer science covers a broad academic area including computer hardware, various algorithms, basic software such as operating systems, application software, and methodology of efficient use of computers. Moreover, the area has continued to expand with many new computational paradigms proposals for parallel computing, network computing and so on. This class explains the area from the basics to applications as easily as possible.
Learning Goals	・Students can design fundamental approximate algorithms and distributed ones. ・Students can evaluate the overview of software projects by using several metrics. ・Students can apply simple static analysis to source code. ・Students can analyze big data by using fundamental parallel processing techniques. ・Students can explain fundamental techniques used in computer vision. ・Students can fundamental techniques used in computer vision. ・Students can explain fundamental techniques of machine learning and lean to the applications.
Requirement / Prerequisite	Nothing
Class Plan	Three classes are offered to each of the following topics (1)-(6). The ordering will be announced in the first class. (1) Introduction to Advanced Algorithm Theory In solving various computing problems, advanced algorithm design is necessary. In this lecture, we introduce fundamental concepts of advanced algorithm theory. Specifically, approximation algorithms and distributed algorithms are introduced. Approximation algorithms computes an approximated solution quickly instead of an exact solution which takes long time to compute. Distributed algorithms are algorithms for networked computers to interact each other. Through the explanations of these fundamental concepts, directions of advanced algorithm designs are presented. (2) Software measurement and analysis In order to appropriately manage software development projects, it is necessary grasp the current status to the plan and take measures for the problems. This lecture explains fundamental knowledge and application cases of quantitative evaluation methods of software development processes and products including software metrics for software quality,

	productivity and some attributes of software processes, some framework for metrics application and analysis methods to calculate values of metrics from software products. (3) Source Code Static Analysis We could retrieve a lot of information from software itself, not only bugs that cause failures, but also to understand the behavior of source code with gathered information. In this talk, we explain source code static analysis to understand written source code: basic concept, application, and research topics on code clone, repository mining, and program slicing. (4) Parallel processing techniques for high performance computing The importance of accelerated computing based on parallel processing is increasing with the popularization of multicore CPUs. This lecture introduces fundamental knowledge and application examples of parallel processing techniques, which are useful to rapidly process a large amount of computation: theoretical methods for estimating the speedup achievable by parallelization, typical parallelization methods, programming methods and system software for big data processing on large-scale cluster and accelerator systems. (5) An introduction to the recent trend in computer vision Computer vision is a research field to understand a real world from images captured by a camera, which includes development of capturing sensors, geometric and photometric analysis of target objects, and recognition of the target objects. This course will cover the following three recent topics in computer vision: 1) Gait identification and its application to criminal investigation, 2) Development of novel imaging sensors exploiting optical encoding. (6) Recently machine learning such as deep leaning is getting attention for estimating events from real world data. In this lecture, we will introduce the examples of the projects which reconstruct a 3D scene from images, extract the knowledge from video and text and recognize a human behaviors from multiple sensors. Students will lean how to apply the machine leaning techniques to the real world applications from the examples.
Independent Study Outside of Class	Each topic requires reporting assignments.
Textbooks	Handouts will be distributed.
Reference	none specified
Grading Policy	Activities in class (40%), reporting assignments (60%)
Other Remarks	Supplementary explanation may be given in Japanese.
Special Note	Nothing
Office Hour	http://www.ist.osaka-u.ac.jp/japanese/curriculum/officehour.html
Messages to Prospective Students	

Cautions for Students
