AY2024 Plans of Creative Factory Seminar
2024年度創造工房セミナーについて

Code	Theme	Instructors (main instructor)
CFS01	Human Activity Analysis and Recognition using Machine Learning Techniques	SHIN, J.
CFS02	Challenge to design your virtual robot and run a race on the moon! ヴァーチャルロボットを自作して月面走行レースに挑戦！	OHTAKE, M., DEMURA, H., OGAWA, Y., YAMADA, R., HONDA, C.
CFS03	Computer-aided Diagnosis and Decision Support System for Adult Diseases	ZHU, X., PEI, Y.
CFS04	Sign Language Recognition with Small Data 少量データを用いた手話認識	JING, L. LI, X.
CFS05	Performance Improvement of an Application Using an FPGA Board	SAITO, H., KOHIRA, Y., TOMIOKA, Y.
CFS06	Developing Spark-Inmemory Big Data Analytical Framework to Find Spatiotemporal Trends in Japan's Air Pollution Database	RAGE, U. K.

CFS01	Human Activity Analysis and Recognition using Machine Learning Techniques
Instructors	SHIN, J.
Course Schedule	June 10 – September 20 * Product creation: June 10 – September 20
Abstract	In recent years, human activity analysis and recognition based on video analysis or sensor data analysis has attracted considerable attention in research and industrial community. This course aims the human activity analysis and recognition using machine learning techniques. The applications of human activity analysis and recognition are spreading in various fields, such as detecting suspicious behavior in public areas, healthcare, elderly people monitoring, fitness tracking, working activity monitoring, human computer interaction, intelligent video surveillance, human-robot interaction, human disorder identification and so on. The purpose of this course is to study feature extraction, selection and machine learning algorithms and use those algorithms to develop human activity analysis and recognition system. In the case of applications, we will mainly focus on human neurological disorder identification and gesture recognition. The basic procedure of a system is as following: 1. Human activity data collection (video based or sensor based) 2. Feature extraction and selection 4. Build the classification or matching or clustering or regression model 5. Take the unknown person data 6. Test and evaluate the model Through this course, we can learn the fundamental knowledge of data analysis, pattern matching, and pattern recognition in the area of human activity analysis and recognition.

CFS02	Challenge to design your virtual robot and run a race on the moon! ヴァーチャルロボットを自作して月面走行レースに挑戦！
Instructors	（Main） OHTAKE, M. （Sub）DEMURA, H., OGAWA, Y., YAMADA, R., HONDA, C.,
Course Schedule	June 12 – July 24 * Product creation： July 30 – August 9
Abstract	In this class, you are going to create your own 3D race track on the Moon based on real lunar surface topographic datasets. Also, you develop your own rover model (a rover with wheels, a rover with two or four legs, or whatever you like) in a Choreonoid simulator. And run a race to win. By attending this class, you will learn/experience how to handle real lunar exploration dataset, create 3D world data, and create and maneuver a rover model. In addition, to run a race together with other members on the lunar surface having smaller gravity than the Earth will be a fun! Schedule: Regular class will be held 2 periods per week (schedule will be fixed based on participants available time slots but tentatively set on Wednesday). One of the lecture will be given by an engineer from company who is a specialist for Choreonoid simulator. And we will set production creation period from 30, July to 9, Aug. 本授業では，探査機により取得した実際の月面地形データを使って計算機シミュレータの中に走行レース場と，ローバの機体モデルを作成した上で，自作したローバモデルを走行させて月面走行レースを体験する．その過程で探査機により取得した地形（標高）データを読み込み，3d データを作成する手法，自身で設計する走行ロボットのモデル化手法とその制御等について体験・学習する． 授業のうち 1 回は，コレオノイドを用いたローバ機体モデルの作成等の専門家である企業からの技術者を招いて実践的な授業・実習を行う．

CFS03	Computer-aided Diagnosis and Decision Support System for Adult Diseases
Instructors	(Main) ZHU, X. (Sub) PEI, Y.
Course Schedule	June 15 – September 20 * Product creation： June 15 – September 20
Abstract	Background Medical HOLO is an augmented technology, blending holographic imaging and electronic medical health information with the real world. Medical HOLO is expected to be used in remote medical education and training augmented reality, medical collaboration and telemedicine reimagined, surgical therapy planning. Goal The goal of this venture factory is to give our graduate students a chance to learn basic knowledge about medical HOLO, get familiar with related VR devices, and learn basic knowledge and skills of 3D model construction. Some knowledge about anatomy, AR, and an open database will be introduced. Some typical implementation of medical HOLO will be developed for possible medical uses. Data Open CT or MRI database will be used for the construction of 3D anatomical models. For example, https://www.nlm.nih.gov/research/visible/visible_human.html A set of Meta Quest 3 Elite and a workstation will be bought to conduct this seminar.

CFS04	Sign Language Recognition with Small Data 少量データを用いた手話認識
Instructors	(Main) JING, L. (Sub) LI, X.
Course Schedule	July 1 – September 20
Abstract	Sign language is an important means of communication for people with speech or hearing impairments. On the other hand, it is difficult for normal people to understand sign language. Therefore, Sign Language Recognition (SLR) is important to facilitate communication between people with speech or hearing impairments and normal people. In this project, we are planning to develop a SLR system with small data set. Therefore, the students can expect to learn the following knowledge and skills: - skeleton calculation method from the video data - data aumentation methods like GAN - classification methods like GCN, LSTM Seminar Schedule: stage 1 (Jul. 1~15) : Project understanding, definition of the system, task assignement, make the development plan. stage 2 (Jul. 16~Aug.31) : system development and evaluation stage 3 (Sep.1~Sep.13) : summary on the project and prepare the presentation

CFS05	Performance Improvement of an Application Using an FPGA Board
Instructors	（Main）SAITO, H. (Sub) TOMIOKA, Y., KOHIRA, Y.
Course Schedule	June 17 – September 17 * Product creation： June 17 － September 17
Abstract	Objective: The main objective of this seminar is to accelerate an application using a field programmable gate array (FPGA) board. Through this seminar, students learn circuit design, performance improvement, or power optimization. Moreover, students learn how to use a tool such as Electronic Design Automation (EDA) tool for their development. Through the seminar, students study 1. how to model an application using a language 2. how to use a tool 3. how a synthesized circuit works on an FPGA board 4. evaluation of the developed circuit Method: 1. Selection of an application such as image processing 2. Modeling of the application using a language 3. Synthesis of an integrated circuit using Intel Quartus Prime or Xilinx Vitis 4. Simulation of the synthesized circuit using a simulator 5. Execution of the synthesized circuit

CFS06	Developing Spark-Inmemory Big Data Analytical Framework to Find Spatiotemporal Trends in Japan's Air Pollution Database
Instructors	RAGE, U. K.
Course Schedule	June 15 – September 20 * Product creation: July 1 – August 15
Abstract	Air pollution is major cause for many cardiorespiratory problems in Japan. Every year at least 60,000 Japanese are dying due to air pollution. To confront this problem, Ministry of Environment, Japan has set up a nation-wide sensor network, called SORAMAME, to record air pollution levels throughout Japan on an hourly basis. The raw data generated by this sensor network naturally exist as Spatiotemporal big data. Useful information that can empower the users (e.g., environmentalists and policy-makers) lies in this big data. The objective of this course is to develop a tool kit that can facilitate the experts to find useful information hidden in the big air pollution data. In this Create Factory Seminar, students will first develop a Big Data Air Pollution Analytical Framework using Hadoop, HBase, and Spark system. Next, students will develop ETL (Extraction, Transformation, and Load) technologies to store the SORAMAME data into the developed big data information. Next, students will develop novel distributed pattern mining algorithms to discover patterns in the big air pollution data. Next, students will evaluate their distributed algorithms against the state-of-the-art sequential/distributed algorithms.