COURSE DETAIL

SPECIAL TOPICS IN DEEP LEARNING

Country
Korea, South

Host Institution
Yonsei University

Program(s)
Yonsei University

UCEAP Course Level
Graduate

UCEAP Subject Area(s)
Electrical Engineering Computer Science

UCEAP Course Number
215

UCEAP Course Suffix

UCEAP Official Title
SPECIAL TOPICS IN DEEP LEARNING

UCEAP Transcript Title
TOPICS DEEP LRNG

UCEAP Quarter Units
4.50

UCEAP Semester Units
3.00

Course Description

This course explores generative artificial intelligence (GAI) and its applications. Students gain a comprehensive understanding of generative models, including deep learning architecture, and probabilistic models. The course covers theoretical foundations and practical implementations of generative AI algorithms. Students also engage in hands-on projects to apply generative AI methods. Topics include introduction to generative AI (overview of generative modeling, brief history of GAI, applications of GAI), probability theory and information theory, parameters estimation, latent variable models, variational inference (introduction), variational autoencoders (VAEs) - autoencoders - variational autoencoders (VAE) - conditional VAE - VQ-VAE v1, v2, generative adversarial networks (GANs) - introduction to GANs - GAN training, issues and solution - generative model evaluation, GAN variants: DCGAN, CGAN, WGAN, ProGAN and Style-GAN, GAN applications: image manipulation and editing, diffusion-based generative models - DDPM - DDIM, diffusion-based generative models - classifier guidance DMs - classifier-free guidance DMs - cascaded DMs - latent DMs, autoregressive generative models - MADE, PixelNN, language generative models - Transformer - GPT family, multi-modal generative models - DALL-E (DALL-E 2 and DALL-E 3) - stable diffusion, flow-based generative models - RealNVP, GLOW.

Prerequisite: Solid understanding of machine learning and deep learning principles - Proficiency in programming - Familiarity with deep learning frameworks (e.g., TensorFlow, PyTorch)

Language(s) of Instruction
English

Host Institution Course Number
EEE7331

Host Institution Course Title
SPECIAL TOPICS IN DEEP LEARNING

Host Institution Course Details

Host Institution Campus
Host Institution Faculty
Host Institution Degree
Host Institution Department
Course Last Reviewed 2024-2025

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