강의개요

Diffusion Models - 이해와 응용

최근의 생성모델의 성능 향상은 새로운 형태의 인공지능 응용 가능성을 보여주고 있다. 본 강의에서는 생성모델 가운데 하나인 Diffusion 모델을 설명한다. 가우시안을 통한 추론 방법의 이해에서 시작하여 Diffusion 모델의 수식을 이해하고, diffusion 모델이 다른 생성 모델과 근본적으로 어떻게 다른지에 대한 논의를 제공할 예정이다. 간단한 실습을 통해 diffusion 모델이 어떻게 작동하는지 살펴본다.

- Diffusion model 개요 및 다른 생성모델과의 개념 비교
- Diffusion 작용과 역작용을 위한 노이즈 예측
- 데이터 생성의 간단한 실습

*참고논문:

1. Jonathan Ho, Ajay Jain, Pieter Abbeel (2020) Denoising diffusion probabilistic models, *Advances in Neural Information Processing Systems 33*

2. Jonathan Ho, Tim Salimans (2022) Classifier-Free Diffusion Guidance, *arXiv:2207.12598*

*교육생준비물:

노트북 (웹브라우저로 구글 CoLab을 실행시킬 수 있는 노트북)

* 강의 난이도: 중급

* 강의: 노영균 교수 (한양대학교 컴퓨터소프트웨어학부 / 고등과학원 계산과학부)

Curriculum Vitae

Speaker Name: Yung-Kyun Noh, Ph.D.

▶Personal Info

Name Yung-Kyun Noh

Title Department Chair, Associate Professor

Affiliation 1. Department of Artificial Intelligence, Hanyang University
2. Department of Computer Science, Hanyang University
3. School of Computational Sciences, Korea Institute for Advanced Study

▶Contact Information

Address 605 ITBT, 222 Wangsimni-ro, Seongdong-gu, Seoul 04763, Rep. of Korea

Email nohyung@hanyang.ac.kr

Research interest: Machine Learning, Nonparametric methods, Information theory

Educational Experience

1998	B.S. in Physics, POSTECH, Rep. of Korea
2011	Ph.D. in Computer Science (Interdisciplinary Program in Cognitive Science), Seoul National University, Rep. of Korea

Professional Experience

2007-2012	Visiting Scholar, Department of Electrical and Systems Engineering, University of Pennsylvania, Philadelphia, PA, U.S.A.
2019-2021	Assistant Professor, Department of Computer Science, Hanyang University, Seoul, Korea
2019-2021	Associate Member, School of Computational Sciences, Korea Institute for Advanced Study, Seoul, Korea
2020-2021	Visiting Scientist, Gastroenterology and Hepatology, Mayo Clinic, Rochester, MN, USA
2018-	Visiting Scientist, RIKEN Center for Advanced Intelligence Project (AIP), Tokyo, Japan
2021-	Affiliate Professor, School of Computational Sciences, Korea Institute for Advanced Study, Seoul, Korea
2021-	Associate Professor, Department of Computer Science, Hanyang University, Seoul, Korea
2022-	Research Collaborator, Gastroenterology and Hepatology, Mayo Clinic, Rochester, MN, USA
2023-	Chair, Dept. of Artificial Intelligence, Hanyang University, Korea

Selected Publications (5 maximum)

1. Lee, J.-W., Won, J.-H., Jeon, S., Choo, Y., Yeon, Y., Oh, J.-S., Kim, M., Kim, S., Joung, I., Jang, C., Lee, S. J., Kim, T. H., Jin, K. H., Song, G., Kim, E.-S., Yoo, J., Paek, E., Noh, Y.-K., Joo, K.

(2023) DeepFold: Enhancing Protein Structure Prediction Through Optimized Loss Functions, Improved Template Features, and Re-optimized Energy Function, *Bioinformatics, 39:12, btad712*

2. Yoon, S., Park, F. C., Yun, G. Kim, S., I., Noh, Y.-K. (2023) Variational Weighting for Kernel Density Ratios, *Advances in Neural Information Processing Systems 36 (NeurIPS)*
3. Yoon, S., Jin, Y.-U., Noh, Y.-K., Park, F. C. (2023) Energy-Based Models for Anomaly Detection: A Manifold Diffusion Recovery Approach, *Advances in Neural Information Processing Systems 36 (NeurIPS)*
4. Jang, C., Lee, S., F. C. Park, Y.-K. Noh (2022) A Reparametrization-Invariant Sharpness Measure Based on Information Geometry, *Advances in Neural Information Processing Systems 35 (NeurIPS)*
5. Lee, H., Lee, J., Choi, Y., Jeon, W., Lee, B.-J., Noh, Y.-K., Kim, K.-E. (2022) Local Metric Learning for Off-Policy Evaluation in Contextual Bandits with Continuous Actions, *Advances in Neural Information Processing Systems 35 (NeurIPS)*