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ISM 2

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Annotated Bibliography: Machine Learning

Atwood, James, and Don Towsley. "Diffusion-convolutional neural networks." *Advances in neural information processing systems* 29 (2016).

The authors have facilitated research on the topic of diffusion-convolutional neural networks (DCNNs) and discovered that this model has several possible advantages over the traditional convolutional neural networks (CNNs) with better accuracy, speed, and flexibility. The authors proceed to provide an understanding of their first-hand research by developing the diffusional network using diffusional kernels that create connections between multiple nodes of the network in a graph in order to create effective node classifications. Furthermore, they analyze their approach using experiments to test the ability of DCNNs to perform graph classification problems using the principles of machine learning such as gradient descent, regularized logistic regression, and bit vectors for each data on the undirected graph. As the authors are knowledgeable in the field of computer science as they are from the College of Information and Computer Science at the University of Massachusetts, they present their findings on the successes of DCNNs, such as the effective representation of nodes in relational node classification, and the limitations of DCNNs, such as scalability and locality of these models, to discuss the usability of DCNNs in the future. Overall, the paper presents detailed findings that are technical in nature, targeted at people familiar with convolutional neural networks, and

provides a critical analysis of the DCNNs and their ability to possibly optimize CNNs with consideration of multiple perspectives.

Bhattacharya, Sweta, et al. "Deep learning and medical image processing for coronavirus (COVID-19) pandemic: A survey." *Sustainable cities and society* 65 (2021): 102589.

The authors, from multiple institutions and departments of computer science, engineering, and information technology from Vellore Institute of Technology in India, Charles Darwin University in Australia, Pusan National University, and Sejong University in South Korea, have facilitated research to understand the implications of deep learning on applications of medical image analysis to combat the outbreak of COVID-19. Furthermore, they use multiple use cases in China, Canada, and Korea that have shown promising results for deep learning medical analysis on COVID-19 along with other breakthroughs in medical analysis in healthcare such as CT Scans and X-Ray images to highlight the benefits of deep learning in the field of medicine. Moreover, they also detail the limitations of machine learning for medical analysis by understanding the absence of publicly available large datasets of COVID-19 cases for medical analysis and scientific decisions that have to be made using deep learning results. This helps them build a nuanced understanding of the use of deep learning in medicine analysis using data metrics and supported research in other periodical journals with credibility.

Kaelbling, Leslie Pack, Michael L. Littman, and Andrew W. Moore. "Reinforcement learning: A survey." *Journal of artificial intelligence research* 4 (1996): 237-285.

The authors, from Carnegie Mellon University and Brown University, created a paper on reinforcement learning in a periodic journal to provide an overview of reinforcement learning to people familiar with machine learning. Furthermore, it provides a history of

reinforcement learning and how it is currently used in many fields from a computer science perspective. The paper discusses the true meaning of reinforcement learning, where agents learn through a trial and error method in a dynamic environment. Furthermore, it provides informative strategies to use reinforcement learning such as statistical techniques, dynamic programming, genetic algorithms, etc. Overall, the paper serves as a guide to knowledgeable experts on understanding possibly ground-breaking strategies in reinforcement learning for use in a variety of fields through its research, models, and survey analysis. The paper also uses many reliable sources of first-hand research, directly tested models, and builds on multiple effects of reinforcement learning to demonstrate its points.

Khan, Wahab, et al. "A survey on the state-of-the-art machine learning models in the context of NLP." *Kuwait journal of Science* 43.4 (2016).

The authors, from the Department of Computer Science and Software Engineering, IIU in Pakistan, and the Faculty of Computing and Information Technology, King Abdulaziz University in Saudi Arabia, discuss hidden Markov models (HMM), conditional random field (CRF), maximum entropy models (MaxEnt), support vector machines (SVM), Naïve Bays, and deep learning (DL). It provides a survey of multiple models in the field of natural language processing (NLP) and provides the multiple techniques used in the field for new researchers to give them a comprehensive overview of the field. Furthermore, the author also provides a critical analysis of classical theory, solutions, issues, and limitations of reinforcement learning in its applications in the future by describing the research in each of its respective stages. Overall, this demonstrates the

source's reliability and objectivity as they focus on each topic with its advantages and disadvantages in natural language processing.

Li, Yuxi. "Deep reinforcement learning: An overview." *arXiv preprint arXiv:1701.07274* (2017).

The author, from Cornell University, presents an overview of the exciting developments in the field of reinforcement learning discussing applications, mechanisms, and elements of the field and updates the past research/developments in machine learning. Furthermore, the article talks about the different stages of policy, reward, model, planning, exploration, and knowledge of the Deep Q Network (DQN). It also highlights many of the well-known examples of reinforcement learning such as AlphaGo, robotics, and the uses of technology in a broad range of fields. The paper serves as a knowledge base used to help people that are new to the field of reinforcement learning and even machine learning to generate awareness of the uses of the field in the future in the subsets of machine learning such as computer visión, natural language processing, computer systems, robotics, games, and a wide variety of industries such as medicine, agriculture, and business that have developments in technology that revolutionize processes using reinforcement learning. Overall, the author uses their knowledge and primary resources in research and development to provide a deep, reliable understanding of reinforcement learning along with a survey of methods in machine learning using their experience and supported research in the field.