Now

Let's start with the most fundamental and cutting-edge hotspots (General ML + LLM)

Next

Deepen your understanding of computer vision (CV) via core models and applications like Audio & Music

Later

Then we can go further with Natural Language Processing and Reinforcement Learning

General Machine Learning

0.1 Generalization & Overparameterization

- Understanding Deep Learning Requires Rethinking Generalization
- Dropout: a simple way to prevent neural networks from overfitting

0.2 Optimization Methods & Training Theory

- Adam a method for stochastic optimization
- Stochastic gradient descent as approximate bayesian inference

0.3 Representation Learning Foundations

- Auto-Encoding Variational Bayes
- Implicit neural representations with periodic activation functions

0.4 Classical Machine Learning Models

- Bias-Variance Decomposition
- Reconciling modern machine learning practice and the classical bias variance trade off

0.5 Dimensionality Reduction & Embeddings

- Visualizing data using t sne
- UMAP uniform manifold approximation and projection for dimension reduction

Computer Vision & Pattern Recognition

2.1 Foundations of CV

- Imagenet classification with deep convolutional neural networks
- Very deep convolutional networks for large scale image recognition

2.2 Detection, Segmentation, and Representation

- Feature pyramid networks for object detection
- Faster R CNN

2.3 Action Recognition & Spatiotemporal Modeling

- Tracking Emerges by Colorizing Videos
- Sequential deep learning for human action recognition

2.4 Vision Transformers & Representation Learning

- CMT convolutional neural networks meet vision transformers
- Swin transformers for semantic segmentation of brain tumors in mri images

2.5 Image Generation, GANs & Diffusion

- A Neural Algorithm of Artistic Style
- Arbitrary style transfer in real time with adaptive instance normalization

NLP

3.1 Foundation of Recurrent Neural Networks

- An application of recurrent neural networks to discriminative keyword spotting
- Simplified minimal gated unit variations for recurrent neural networks

3.2 Temporal & Structured Modeling

- Neural turing machines
- Learning precise timing with lstm recurrent networks

3.3 Applications in Language and Speech

- Recurrent neural networks for time series forecasting
- Deep speech 2 end to end speech recognition in english and mandarin

Deep Learning ahd Large Language Model

1.1 Foundation Models & Scaling Laws

- Language models are few shot learners
- Training compute optimal large language models

1.2 Instruction Tuning and Tool Use

- Code llama open foundation models for code
- Toolformer language models can teach themselves to use tools

1.3 LLMs as Agents and Reasoners

- Generative agents interactive simulacra of human behavior
- Rlaif scaling reinforcement learning from human feedback with ai feedback

1.4 Fine-Tuning and Generalization Mechanisms

- Large language models encode clinical knowledge
- Intrinsic dimensionality explains the effectiveness of language model fine tuning

Audio

4.1 Speech Recognition and Acoustic Modeling

- Rrobust speech recognition via large scale weak supervision whisper
- Scaling speech technology to 1000 languages mms

4.2 Audio Synthesis

- Voicebox text guided multilingual universal speech generation at scale
- Audiopalm a large language model that can speak and listen

4.3 Music Generation

- Mulan a joint embedding of music audio and natural language
- Simple and controllable music generation musicgen

Reinforcement Learning

5.1 Fundamentals of Deep RL

- Playing atari with deep reinforcement learning
- Proximal policy optimization algorithms

5.2 Real-world Applications

- Learning from delayed rewards
- Outracing champion gran turismo drivers with deep reinforcement learning sophy

5.3 Scientific Discovery & Decision Making

- Learning to predict by the methods of temporal differences
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