General AI/ML

Unit 2: Optimization,
Fine-tuning, Transfer Learning

2.2.1

Pre-trained Models

Overview of Pre-trained Models

TIL-AI
TODAY I LEARNED-AI

What are Pre-trained Models?

- Pre-trained models are neural networks that have been trained on massive datasets for a general purpose
- Have learned to extract patterns and representations from data (images, text, audio etc.)
- Models with a vast storehouse of pre-built knowledge

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Why Use Pre-trained Models

- Reduced training time: Pre-trained models eliminate the need to train from scratch, significantly saving development time
- Better performance: Models benefit from the knowledge gained from massive datasets, often outperforming those trained from scratch
- Accessibility: They make AI more accessible to developers without requiring extensive machine learning expertise

Transfer Learning

- Transfer learning is the process of adapting a pre-trained model to a new, specific task
- We can reuse knowledge from the pre-trained model by freezing some layers and fine-tuning others
- This technique enables rapid and effective model development for a wide range of tasks

Popular Pre-Trained Models

- Natural Language Processing (NLP):
  - BERT
  - GPT-4
  - ELMo
  - Transformer-XL
  - RoBERTa

- Computer Vision:
  - MobileNetV2
  - Vision Transformer
  - YOLO

- Speech Recognition:
  - Whisper
  - Wave2Vec2
  - DeepSpeech

Applications of Pre-trained Models

- Natural Language Processing
  - Machine translation
  - Chatbots and virtual assistants
  - Sentiment analysis
- Computer Vision
  - Image and video classification
  - Self-driving cars
  - Medical image analysis
- Automatic Speech Recognition
  - Voice assistants and smart speakers
  - Real-time transcription services
  - Accessibility tools for individuals with disabilities

The Future of Pre-trained Models

- Expect larger, even more powerful pre-trained models
- Increased specialization tailored to specific domains
- Greater accessibility through easier-to-use libraries and frameworks for ex: HuggingFace
- Driving continued innovation and breakthroughs across AI fields