



# Module 6



# Introduction to Generative Models



- Beyond Regression and Classification - Generating tokens and pixels (demo of CoPilot, Lexica)
- Think of parameters as memory of the model (augmented memory and lookup will be introduced later)

Images:

- AutoEncoders, Denoising Autoencoders, VAEs
- GANs
- UNET and Stable Diffusion

Text:

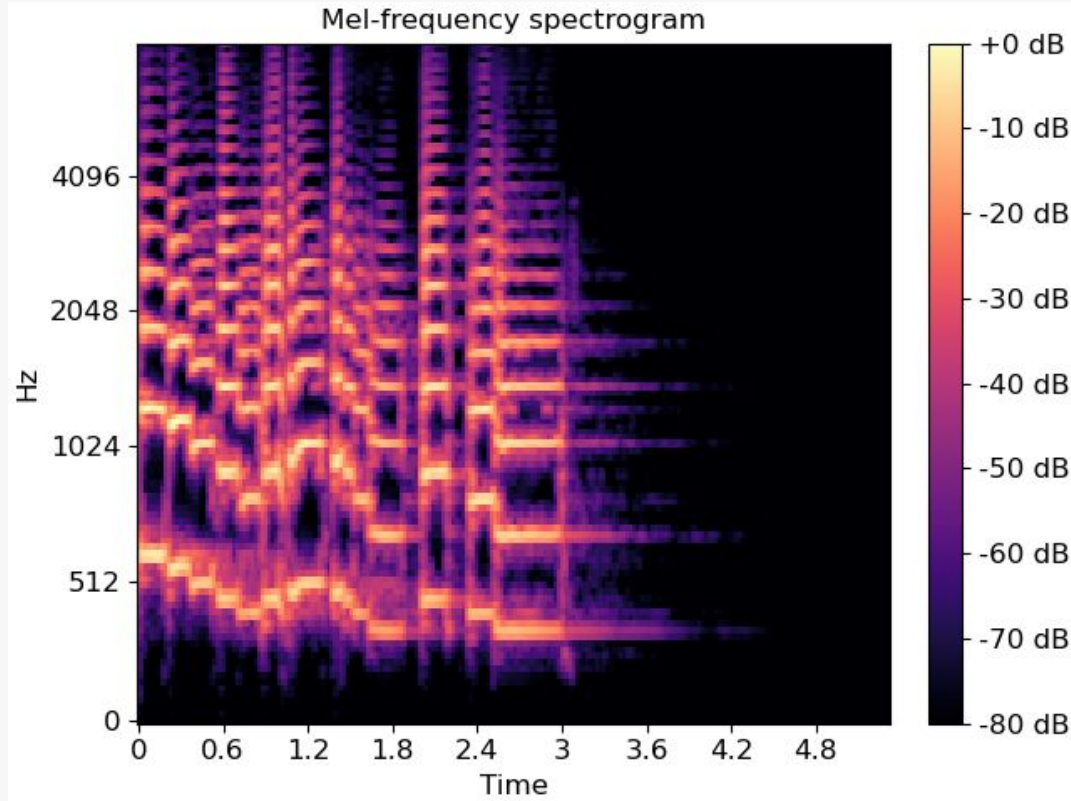
- LLMs

Audio:

- Spectrograms
- Tokens



# Audio processing using CNNs



# Generative Models



From predictions to creation.

- Create Audio/Speech (AWS Polly/Tacotron)
- Create Images (DallE/Imagen)
- Video: <https://youtu.be/cQ54GDm1eL0>
- Segmentation

```
<speak>
```

```
<amazon:effect name="whispered">If you make any noise, </amazon:effect>
```

```
she said, <amazon:effect name="whispered">they will hear  
us.</amazon:effect>
```

```
</speak>
```

**Semantic  
Segmentation**



GRASS, CAT,  
TREE, SKY

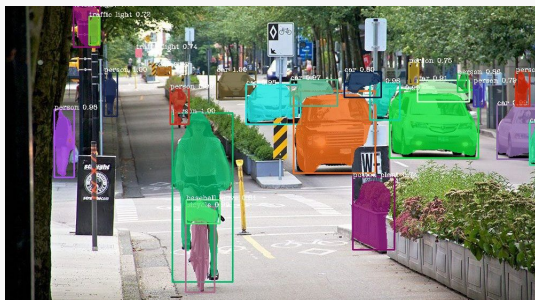
No objects, just pixels

**Classification  
+ Localization**



CAT

Single Object



Input



Ground truth



Prediction



# LLM use cases



- Summarization
- Text Expansion
- Question Answering - (Open Domain, Closed Domain)
- Coding
- Named Entity Extraction



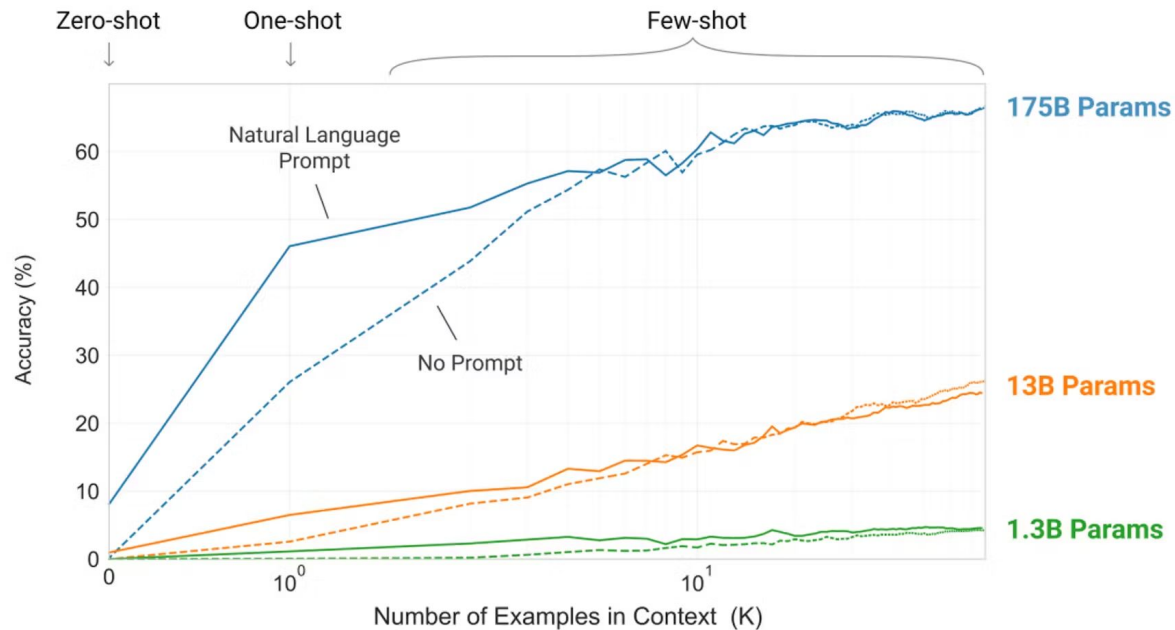
# Language Models 101



- Prompts and completions (zero/one/few shot)
- Context window
- Inference Settings (Max tokens, top-p/k, temperature)



# Generalization in LLMs



From the [GPT3 paper](#)

# Language Models 101



- Atomic Chats - No memory
- Memory as a buffer
- Hallucinations
- Tool Usage





# LLM Libraries



- OpenAI
- HuggingFace Transformers
- Langchain
- LLamaIndex

## Popular Models:

- GPT4, GPT v3.5 Turbo
- Anthropic Claude2
- Mosaic MPT
- Falcon
- Llama/Llama2



# ChatGPT + Langchain intro



Langchain notebook exercises



# What Now?



**Andrej Karpathy**   
@karpathy

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