CMSC 373 Artificial Intelligence Fall 2025 22-WrapUp

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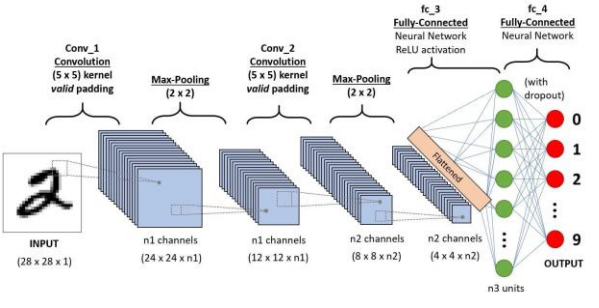
Review for Exam 3

- **Convolution Networks**
  - AlexNet
  - Data Augmentation
  - Data/Batch Normalization
  - Cognitron, NeoCognitron
  - Convolutions
  - Deep Learning
  - Dropout
  - Feature Maps (Patches/Kernels/Filters)
  - Image Classification
  - Local patterns
  - LeNet
  - Maxpooling
  - Object detection
  - Overfitting
  - VGGNet
  - Visual Cortex (Hubel & Wiesel)



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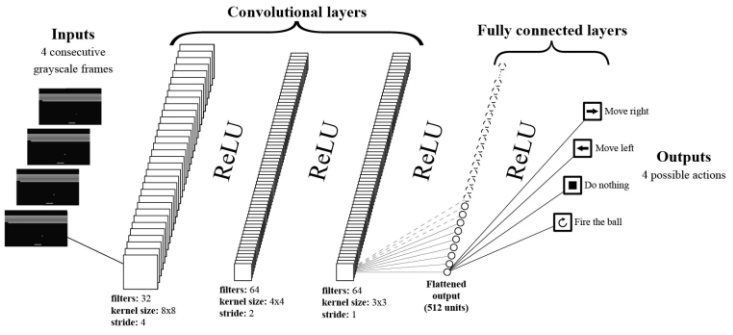
Review for Exam 3

- **DeepQLearning**
  - Action
  - AlphaGo Zero
  - AlphaGo
  - Atari
  - Atari Learning Environment
  - Breakout
  - DeepMind
  - DQN – Deep Q Network
  - Episode
  - Monte Carlo Tree Search
  - Q Learning
  - Q Table
  - Reward
  - State
  - Unsupervised Learning
  - Reinforcement Learning



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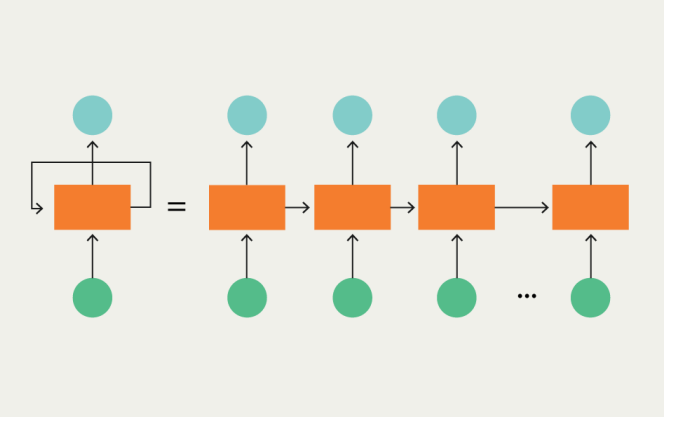
Review for Exam 3

- **Neural Networks for Natural Language**
  - Encoding
  - De-Biasing
  - Decoding
  - Geometric Space
  - GLoVe
  - Language Modeling
  - LSTM
  - NETTalk
  - One-Hot Encoding
  - OOV Words
  - Pragmatics
  - RNNs
  - Syntax
  - Semantic Space
  - Semantics
  - Sentiment Analysis
  - Standardizing
  - Summarization
  - Text Classification
  - Thought Vectors
  - Tokenizing
  - Vectorizing
  - Word Embedding
  - Word2Vec



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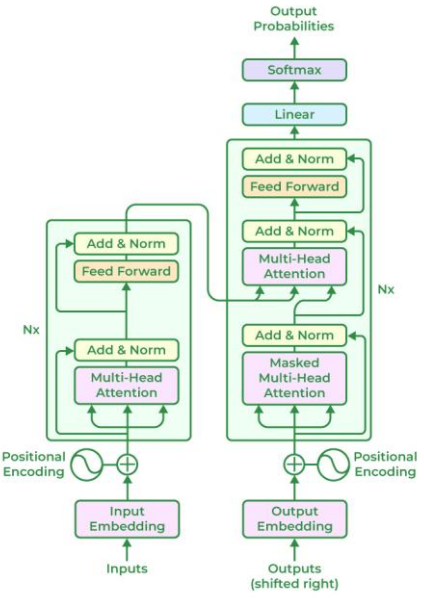
Review for Exam 3

- **Transformers**
  - Language Modeling
  - NGrams
  - Attention
  - Base Model
  - Encoder
  - Decoder
  - Large Language Models (LLMs)
  - Sequence to Sequence Models
  - Transformers
  - Word Embedding
  - Conditional Generation
  - Positional Encoding
  - Multi-Head Attention
  - Sampling
  - Pretraining
  - Finetuning
  - Alignment
  - Evaluation
  - Ethical Issues



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Course Wrap Up

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AI – History, Foundations, Applications, Implications

- **History/Landmarks**
  - Turing Test, 1950
  - Dartmouth Summer School (1956)
  - Perceptron, 1958
  - The seasons of AI
  - Lighthill Report (1970s)
  - Backpropagation (1980s)
  - Japan's Fifth Generation Project (1990s)
  - Deep Blue (1997)
  - Google Translate (2000s)
  - IBM Deep Blue (2012)
  - Google's Cat recognition (2012)
  - ImageNet (2012)
  - ChatGPT (2022)

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AI – History, Foundations, Applications, Implications

- **Foundations**
  - Strong vs Weak AI
  - Symbolic and Subsymbolic Approaches
  - Search Algorithms (Heuristics. Depth-first, Breadth-First, Best-First. A*, Minimax, Alpha-Beta Pruning, MCTS)
  - Knowledge Representation & Reasoning (Logic, Rule-Based, Frames, Semantic Networks, CD, Knowledge Graphs)
  - Planning Systems (STRIPS)
  - Expert Systems
  - Forward/Backward Chaining
  - Commonsense Knowledge
  - Embodied Intelligence (Intelligence Without Representation, Behavioral AI)
  - Agent-Based AI (rational Agents)
  - Neural networks (McCulloch-Pitts, Perceptron, MLP, NN Learning, Backpropagation, Gradient Descent, SGD)
  - Deep Learning (RNNs, Convolutional networks, Transformers)
  - Ethical AI

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AI – History, Foundations, Applications, Implications

- **Systems/Applications** (partial list)
  - ChatBots (from ELIZA to ChatGPT)
  - SHRDLU, SHAKEY, STRIPS, MYCIN, R1/XCON, ZOOKEEPER, PROLOG
  - Game Playing
  - GPS Navigation
  - CYC
  - Amazon, Wikipedia, Google's use of Knowledge Graphs
  - Robots (Genghis, Cog, Boston Dynamics Big Dog, Spot, Mars Rovers)
  - Alexa, Google's Assistant, Cortana
  - MNIST Digit Recognition
  - Keras, Google Colab
  - Object Recognition
  - Face Recognition

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AI – History, Foundations, Applications, Implications

- **Implications**
  - Ethical AI
  - Biased AI
  - Trustworthy AI
  - Beneficial AI
  - Future of AI
  - AI Legislation

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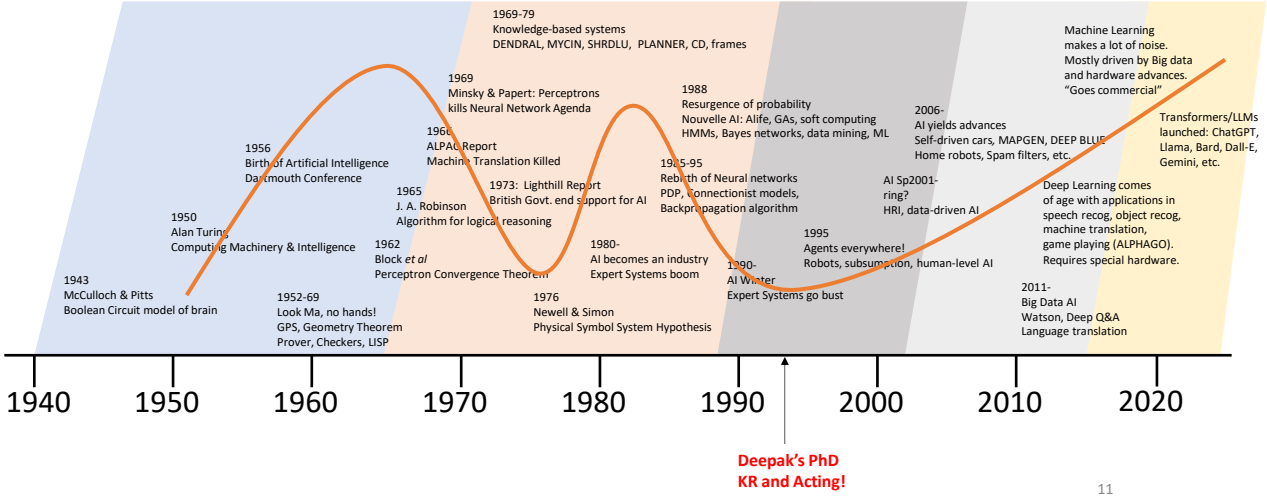
Landmarks in AI History



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Wrap Up

Topics (Ambitious/Tentative List)

What is AI
Turing Test
Symbolic versus Subsymbolic AI
Narrow versus AGI
ELIZA
Winograd Schemas
The Winters of AI
Perceptron
Planning/Problem Solving
SHRDLU
SHAKEY
STRIPS
Search Algorithms
Heuristics
Knowledge Representation & Reasoning
Logical Reasoning
Expert Systems
MYCIN
R1/XCON
DENDRAL
CYC

Knowledge Graphs
Commonsense Reasoning
Perceptrons
Neural Networks
Backpropagation
Deep Learning
Convolution Neural Networks
ImageNet
Bias in AI Systems
Robots
Reinforcement Learning
Deep Q-Learning
AlphaGo
Natural Language Understanding
Recurrent Neural Networks
Word2Vec
Watson
ChatGPT
Explanable AI
Neuro-Symbolic Systems
Are we there yet?

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Most AI is Narrow AI

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Narrow tasks are not the first step towards AGI

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LLMs have given us a glimpse of “Wider AI”

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Easy things are hard

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Hard things are harder

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Wishful mnemonics are dangerous

Thought Vectors
Hallucinations
Dream Machines

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Nowhere to go without embodiment

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Alignment with human values

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Are we there yet?

No.

21

Are we there yet?

LLMs are not going to get us to AGI/ASI

No.

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Are we there yet?

LLMs are not going to get us to AGI/ASI

What's missing?
(A lot!!)

No.

Thank you!!!

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