



Convolutional Neural Network (Cheetah)

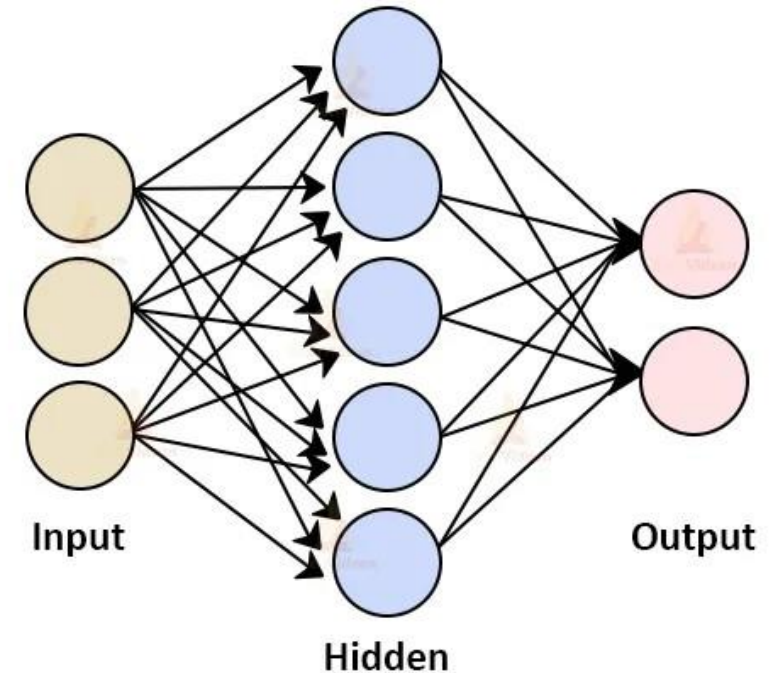
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Image: DALL E, OpenAI, 28 Feb 2024.

Artificial Neural Network (ANN)

- Inspired by the human brain's neural networks, ANN enable computers to process information through layers.
- “uses interconnected nodes or neurons in a layered structure that resembles the human brain” (AWS, 2024).
- Excel at comprehending unstructured data and understand patterns with no training.

Architecture of Artificial Neural Network



Neural Network Zoo Tour

- Imagine that the different network architectures are like the different animals in a zoo, each with its own characteristics:
- Convolutional Neural Networks (CNN) represented by the Cheetah
- Recurrent Neural Network (RNN) represented by the Raccoon
- Long Short-Term Memory (LSTM) represented by the Lemur



Convolutional Neural Network (Cheetah)

- Just like cheetahs are known for their incredible speed and agility, CNNs excel at:
- Processing and analyzing visual imagery quickly and efficiently, recognizing patterns in images.
- Ideal for image classification and object detection tasks.



Typical CNN Applications

- Image Classification
- Face Recognition
- Medical Image Computing
- Health Risk Assessment
- Precision Medicine
- Drug Discovery

Recurrent Neural Network (Raccoon)

- Raccoons are clever and adaptable, capable of remembering and learning from their actions.
- Similarly, RNNs are designed to handle sequential data, remembering past information to make predictions about future events.
- Well-suited for time series prediction and language modeling.



Typical RNN Applications

- Language Translation
- Speech Recognition
- Time Series Prediction
- Music Generation
- Sentiment Analysis
- Video Frame Prediction

Long Short-Term Memory (Lemur)

- Lemurs, with their distinctive eyes, suggest a keen awareness and the ability to navigate complex environments.
- LSTMs, a special kind of RNN, are particularly good at remembering information for long periods, great for addressing the vanishing gradient problem.
- Effective for tasks that require understanding context over time, such as speech recognition and text generation.



Typical LSTM Applications

- Text Generation
- Handwriting Recognition and Generation
- Sequential Image Labeling
- Anomaly Detection in Time Series Data
- Speech Synthesis
- Machine Translation with Attention Mechanisms

End of Neural Network Zoo Tour

- With different characteristics and capabilities, different neural network architectures are implemented to solve complex real-world problems.
- Understanding their nuances, applications, and limitations is key in developing efficient networks.



References

- Image Source: Generated by DALL·E on February 28, 2024, OpenAI.
- Lee, H.Y. "Machine Learning." *YouTube*, 2021, www.youtube.com/watch?v=OP5HcXJg2Aw.
- Analytics Vidhya. "Convolutional Neural Networks." *Analytics Vidhya*, 2023, www.analyticsvidhya.com/blog/2021/10/applications-of-convolutional-neural-networkscnn/.
- "The Neural Network Zoo." *The Asimov Institute*, www.asimovinstitute.org/neural-network-zoo/. Accessed on March 26, 2024.
- "Neural Network." *Amazon Web Services (AWS)*, Amazon, www.aws.amazon.com/what-is/neural-network/. Accessed on March 26, 2024.
- "Architecture of Artificial Neural Network." *Knoldus Blogs*, Knoldus Inc., blog.knoldus.com/architecture-of-artificial-neural-network/. Accessed on March 26, 2024.