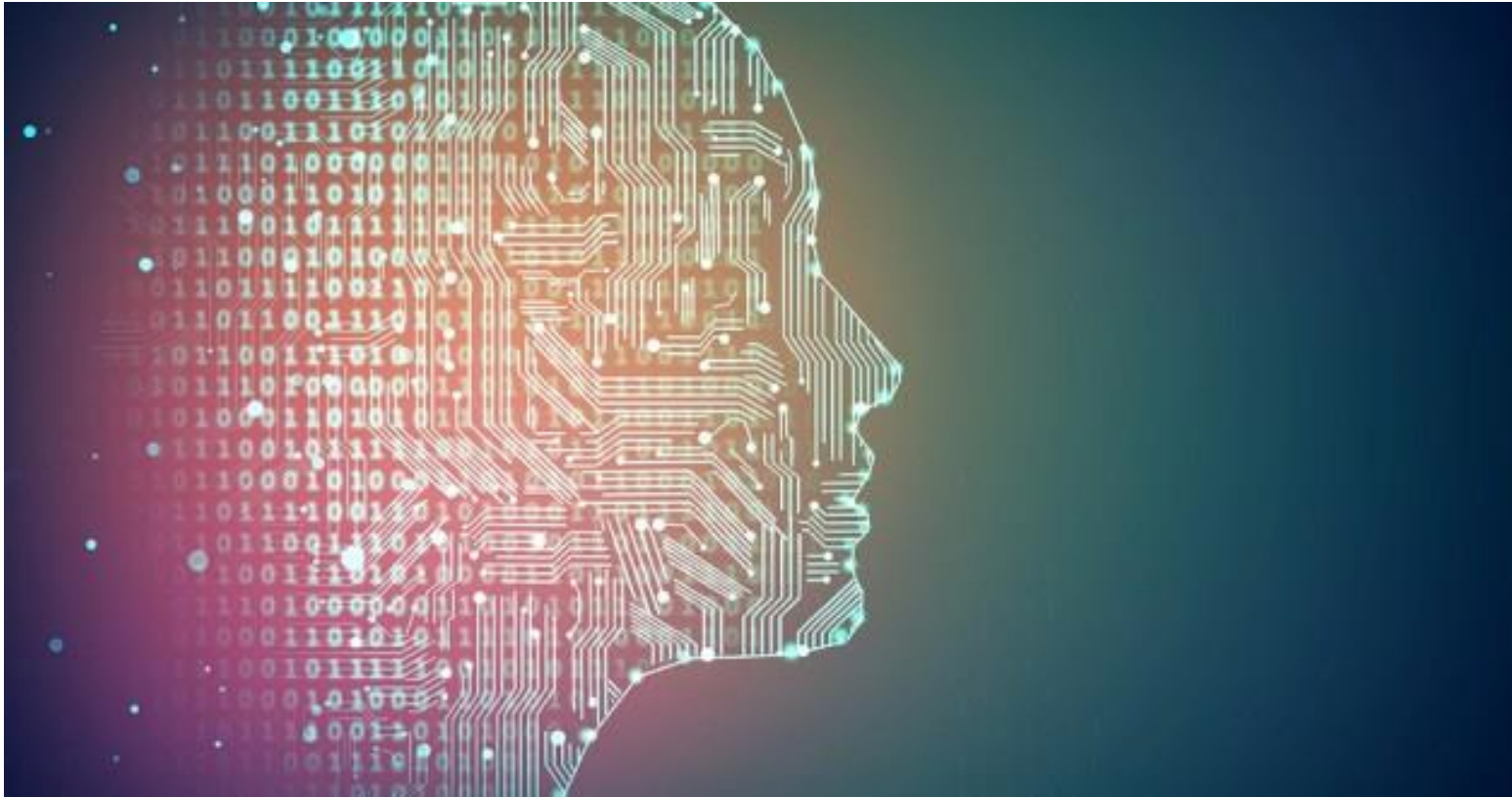# Generative AI: LLM: Transformers

Thuan L Nguyen, PhD

2: Generative AI: LLM: Transformers

AI Deep learning (Source: mindovermachines.com)

3: Generative AI: LLM: Transformers

1. AI: Generative AI: Introduction: A Definition

2. AI: Generative AI: LLM: Foundational Sciences and Technologies

3. AI: Generative AI: LLM: Transformers: Introduction

4. AI: Generative AI: LLM: Transformers: Attention Is All You Need!

5. AI: Generative AI: LLM: Transformers: The NLP Revolution

6. AI: Generative AI: LLM: Transformers: A Gigantic Leap in NLP Technologies

7. AI: Generative AI: LLM: Transformers: NLP before the Transformers
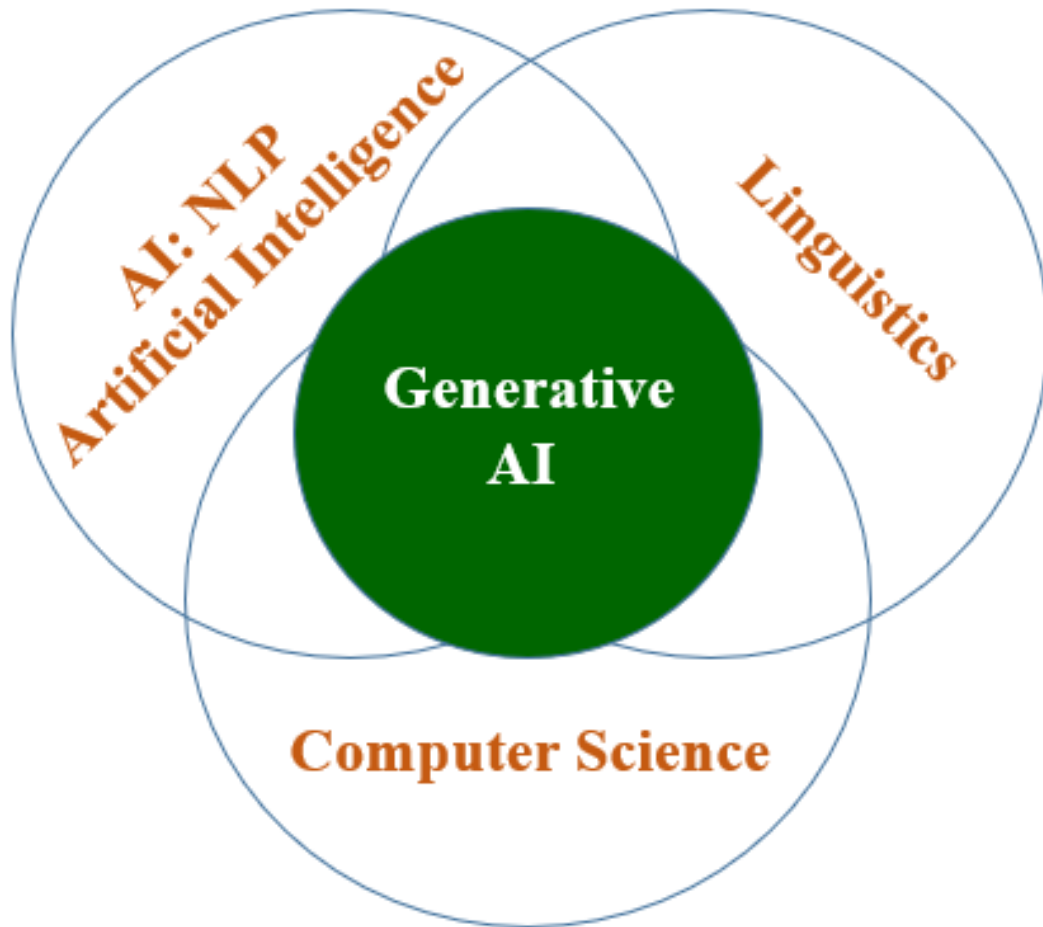
Artificial Intelligence: Generative AI

What is It?

Generative AI: A category of artificial intelligence focused on using AI deep learning models to generate new contents, including text, images, audio, video, and more. The contents are novel but look realistic and may be indistinguishable from human-created ones.

Artificial Intelligence: Generative AI: LLM

What is It?

Generative AI is based on the NLP technologies such as Natural Language Understanding (NLU) and Conversational AI (AI Dialogues) - Those among the most challenging tasks AI needs to solve.

Artificial Intelligence: Generative AI: LLMs

Large Language Models

Large Language Models (LLMs) are revolutionary AI **Deep Learning neural networks** that excel in natural language understanding (NLU) and content generation.

- "LARGE" in LLMs refers to the vast scale of data and parameters used to train them, allowing LLMs to develop a comprehensive understanding of language.
- Being particularly transformer-based models trained on massive text datasets using deep learning techniques,
- Able to learn complex language patterns, capture nuances like grammar and tone, and generate coherent and contextually relevant text

Artificial Intelligence: Generative AI: LLMs

Large Language Models: Transformers

Source: Thuan L Nguyen – AI Generated images using Google-DeepMind ImageFX

"**Attention Is All You Need!**"

Source: *Thuan L Nguyen – AI Generated images using Google-DeepMind ImageFX*

Large Language Models: Transformers

A Revolutionary Invention in AI: NLP

The **Transformer** is not just a neural network.

It represents a **disruptive gigantic shift** in the vast landscape of **Natural Language Processing** (NLP) and **Artificial Intelligence** (AI).

Source: Thuan L Nguyen – AI Generated images using Google-DeepMind ImageFX

10: Generative AI: LLM: Transformers

Large Language Models: Transformers

A Revolutionary Invention in AI: NLP

The **Transformer's** revolutionary features have led to **disruptive stunning achievements** and **advancements** in many AI fields such as Natural Language Understanding (NLU), Language Generation, and Conversational AI, to name a few.

Source: Thuan L Nguyen – AI Generated images using Google-DeepMind ImageFX

Large Language Models: Transformers

A Revolutionary Invention in AI: NLP

The **Transformer** will remain a **foundational neural network** that continues shaping the future of language-based artificial intelligence (AI), especially the **generative AI** and **conversational AI**. Its **impacts on society** will be **deep** and **broad**.

Source: *Thuan L Nguyen – AI Generated images using Google-DeepMind ImageFX*

12: Generative AI: LLM: Transformers

Large Language Models: Transformers

A Revolutionary Invention in AI: NLP

"Attention Is All You Need!"

The **Transformer** and **Attention-Based Neural Networks**: A revolution in the world of Artificial Intelligence (AI) **Natural Language Processing** (NLP).

Source: Thuan L Nguyen – AI Generated images using Google-DeepMind ImageFX

Large Language Models: Transformers

A Revolutionary Invention in AI: NLP

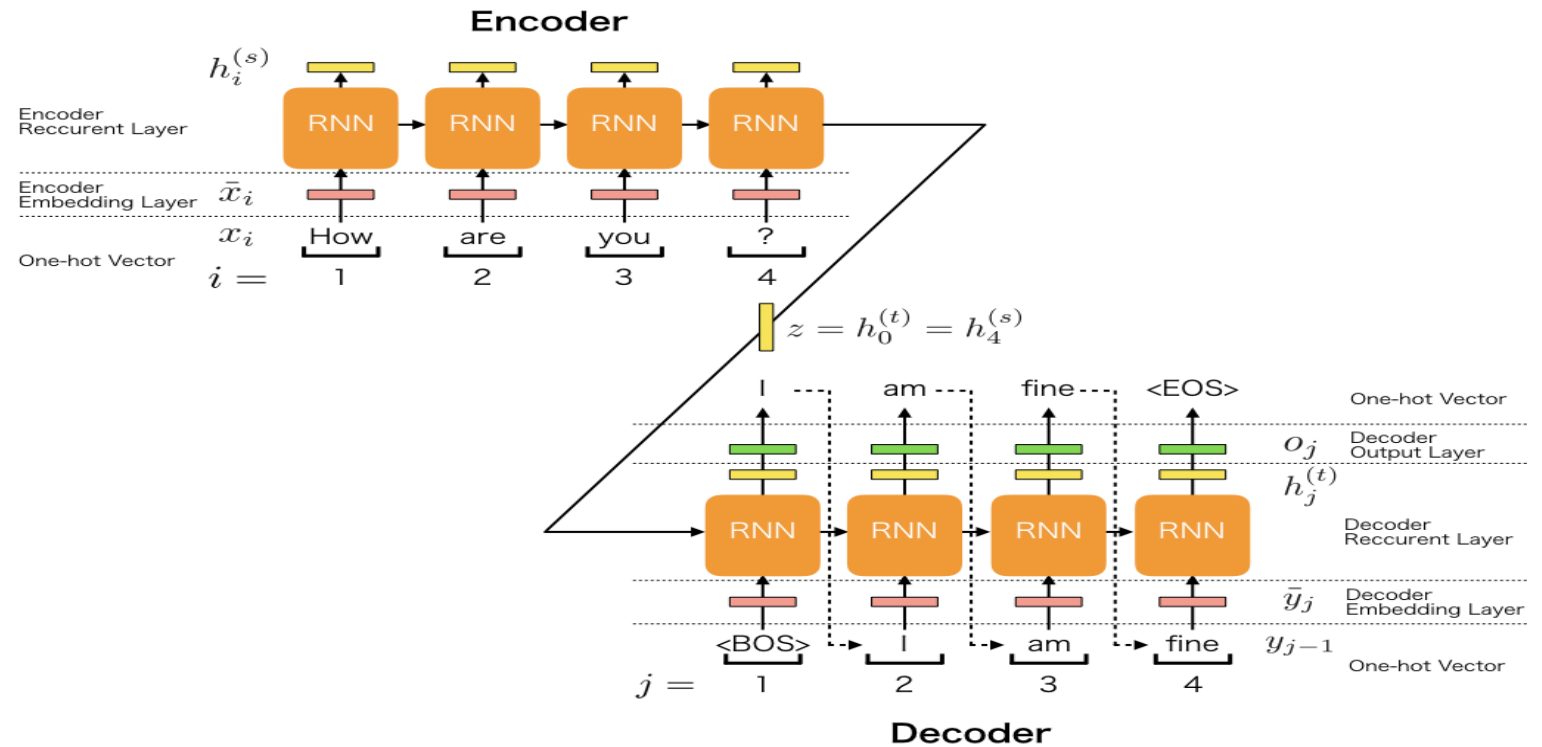What kind of NLP had been **before** the **Transformer Revolution**?

Large Language Models: Transformers

A Revolutionary Invention in AI: NLP

What kind of NLP had been **before** the **Transformer Revolution**?

The **Sequence** Era (Sequence-to-Sequence)

Source: https://docs.chainer.org/en/stable/examples/seq2seq.html

Large Language Models: Transformers

A Revolutionary Invention in AI: NLP

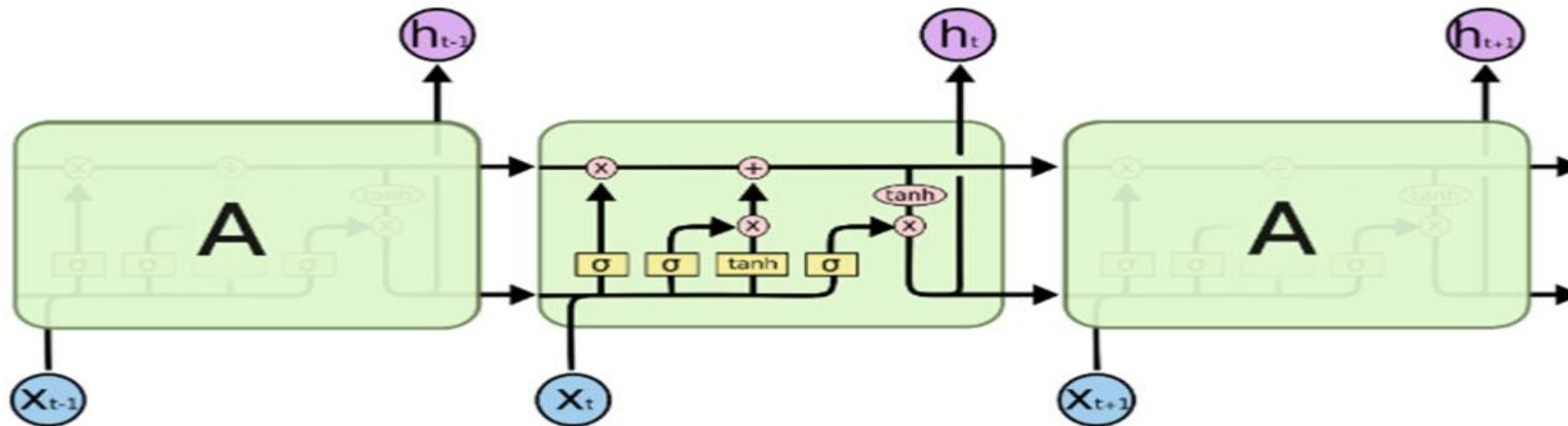# What kind of NLP had been **before** the **Sequence Era**?

16: Generative AI: LLM: Transformers

Large Language Models: Transformers

A Revolutionary Invention in AI: NLP

What kind of NLP had been **before** the **Sequence Era**?

The **RNN** Period (SimpleRNN, LSTM, GRU)

Unrolled LSTM Neural Network (Source: Colah Blogs)

Large Language Models: Transformers

A Revolutionary Invention in AI: NLP

What kind of NLP had been **before** the **Recurrent Neural Network (RNN) Period**?

Times of **Statistical** Methods & **Phase-Based** Approaches