

# LLM & NLP Interview Questions – Basics

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## Profile

Hello, my name is **Brahim Ouhammou**. I am a student in **Artificial Intelligence and Machine Learning** at the Faculty of Sciences, and I am also currently studying at **1337 Coding School**.

I have a strong foundation in **programming and problem solving**, with skills in **Python, C, and C++**, as well as experience in **machine learning and deep learning**. I have worked on practical projects involving **CNN-based models, AI-driven systems, and Docker-based infrastructures**.

I also implemented **FTIRC (Internet Relay Chat)**, an IRC server in **C++** that handles multiple clients simultaneously, focusing on **network programming and socket communication**, as well as **other projects in low-level programming**.

As part of my training at **1337**, I am seeking a **6-month internship**, where I can apply my skills, learn from real-world projects, and continue developing as an **AI and software engineer**.

## 1 NLP Basics

### 1. What is NLP?

Natural Language Processing (NLP) is a field of Artificial Intelligence that enables computers to understand, interpret, and generate human language.

### 2. Common NLP Tasks

- Tokenization
- Part-of-Speech (POS) tagging
- Named Entity Recognition (NER)
- Sentiment Analysis
- Machine Translation
- Text Summarization
- Question Answering

### **3. What is Tokenization?**

Tokenization is the process of splitting text into smaller units such as words, subwords, or characters.

### **4. Stemming vs Lemmatization**

- **Stemming:** Removes word endings crudely (may not produce real words).
- **Lemmatization:** Converts words to their dictionary form using linguistic rules.

### **5. What is a Corpus?**

A corpus is a large collection of text data used for training or evaluating NLP models.

## **2 Text Representation**

### **6. Bag of Words (BoW)**

Bag of Words represents text as word frequency vectors, ignoring word order and grammar.

### **7. TF-IDF**

TF-IDF (Term Frequency–Inverse Document Frequency) measures the importance of a word in a document relative to a corpus.

### **8. Word Embeddings**

Word embeddings are dense vector representations of words that capture semantic meaning.

### **9. Examples of Embedding Models**

- Word2Vec
- GloVe
- FastText

## **3 Language Models**

### **10. What is a Language Model?**

A language model predicts the probability of the next word given previous words.

### **11. N-gram Models**

An n-gram model predicts the next word using the previous  $n - 1$  words.

## **12. Limitations of N-gram Models**

- Data sparsity
- Large memory requirements
- Poor long-range dependency handling

# **4 Neural Networks for NLP**

## **13. Why RNNs in NLP?**

Recurrent Neural Networks process sequential data and maintain contextual memory.

## **14. Problems with RNNs**

- Vanishing gradients
- Difficulty capturing long-term dependencies

## **15. LSTM and GRU**

LSTM and GRU use gating mechanisms to preserve long-term information and solve vanishing gradient issues.

# **5 Transformers and LLMs**

## **16. What is a Transformer?**

A Transformer is a neural network architecture based on self-attention that processes sequences in parallel.

## **17. Self-Attention**

Self-attention allows each word to focus on other relevant words in a sentence to understand context.

## **18. Advantages of Transformers**

- Parallel computation
- Better long-range dependency modeling
- Faster training

## **19. What is an LLM?**

A Large Language Model (LLM) is a Transformer-based model trained on massive text data to perform multiple NLP tasks.

## **20. Examples of LLMs**

- GPT
- BERT
- LLaMA

## **21. BERT vs GPT**

- **BERT**: Bidirectional, designed for understanding tasks.
- **GPT**: Autoregressive, designed for text generation.

## **22. Fine-Tuning**

Fine-tuning adapts a pretrained model to a specific task using labeled data.

## **23. Prompt Engineering**

Prompt engineering is the practice of designing inputs to guide model outputs without retraining.

# **6 Training and Evaluation**

## **24. Loss Function in LLMs**

Cross-entropy loss is commonly used in language modeling.

## **25. Perplexity**

Perplexity measures how well a language model predicts text; lower values indicate better performance.

## **26. NLP Evaluation Metrics**

- Accuracy
- Precision, Recall, F1-score
- BLEU (machine translation)
- ROUGE (summarization)

# **7 Advanced Concepts**

## **27. Out-of-Vocabulary Handling**

Subword tokenization techniques such as BPE and WordPiece are used.

RAG combines external document retrieval with text generation to improve factual accuracy.

### 30. Retrieval-Augmented Generation (RAG)

- Retrieval-Augmented Generation (RAG)

- Fine-tuning

- Better Prompts

### 29. Reducing Hallucination

Hallucination occurs when a model generates incorrect but confident responses.

### 28. Hallucination in LLMs