T5 Model with FAISS for Fake News Detection

# Introduction

This document describes the use of the T5 (Text-to-Text Transfer Transformer) model combined with FAISS (Facebook AI Similarity Search) for the task of Fake News Detection. The goal is to accurately classify whether a given news article is 'real' or 'fake' using an advanced AI-driven architecture.

# What is T5?

T5 is a unified transformer architecture by Google that treats every NLP task as a text-to-text problem. It enables consistent handling of tasks such as classification, summarization, and translation using the same model.

# Why T5 is Suitable for Fake News Detection

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| --- | --- |
| **Feature** | **Explanation** |
| **Unified Framework** | Handles classification as text generation. |
| **Language Understanding** | Pretrained on large text corpora with rich semantic understanding. |
| **Transfer Learning** | Performs well with limited labeled data. |
| **Prompt Flexibility** | Supports customizable natural language prompts. |
| **Multitask Capability** | Easily adaptable to summarization and question answering. |

# Why Combine T5 with FAISS?

FAISS is used to retrieve contextually similar real news articles. Combining FAISS with T5 enhances classification by providing factual context to the model before making predictions.

Typical workflow:

1. Encode trusted news articles into vector embeddings.

2. Index them using FAISS.

3. Retrieve top-k relevant articles for each new input.

4. Combine retrieved context with the article and classify using T5.

# Device & Environment Requirements

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| **Component** | **Minimum** | **Recommended** |
| **GPU** | GTX 1660 Ti / RTX 2060 | RTX 3060 / T4 / A100 |
| **VRAM** | 6–8 GB | 12+ GB |
| **RAM** | 8 GB | 16–32 GB |
| **Disk** | 10 GB | SSD for speed |

# Prompt Engineering Examples

Prompt: "classify: The president announced a new plan to expand healthcare coverage..."

Output: "real"

Prompt: "classify: Scientists discover a method to live forever using energy drinks..."

Output: "fake"

# T5 Model Sizes and Use Cases

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| --- | --- | --- | --- |
| **Model** | **Parameters** | **VRAM Needed** | **Use Case** |
| **t5-small** | 60M | ~4–5 GB | Testing, CPU-friendly |
| **t5-base** | 220M | ~8–10 GB | Balanced performance |
| **t5-large** | 770M | ≥12 GB | High accuracy, needs GPU |
| **t5-3b** | 3B | 24+ GB | Enterprise use |
| **t5-11b** | 11B | 60+ GB | Research-grade only |

# Summary: Why T5 + FAISS for Fake News Detection

• Strong semantic understanding from T5.

• Context-aware classification with FAISS.

• Scalable and adaptable to more NLP tasks.

• Easy to integrate using Hugging Face APIs.

# Appendix: T5 Architecture Diagram

Insert T5 architecture diagram below (not included in code-generated file).