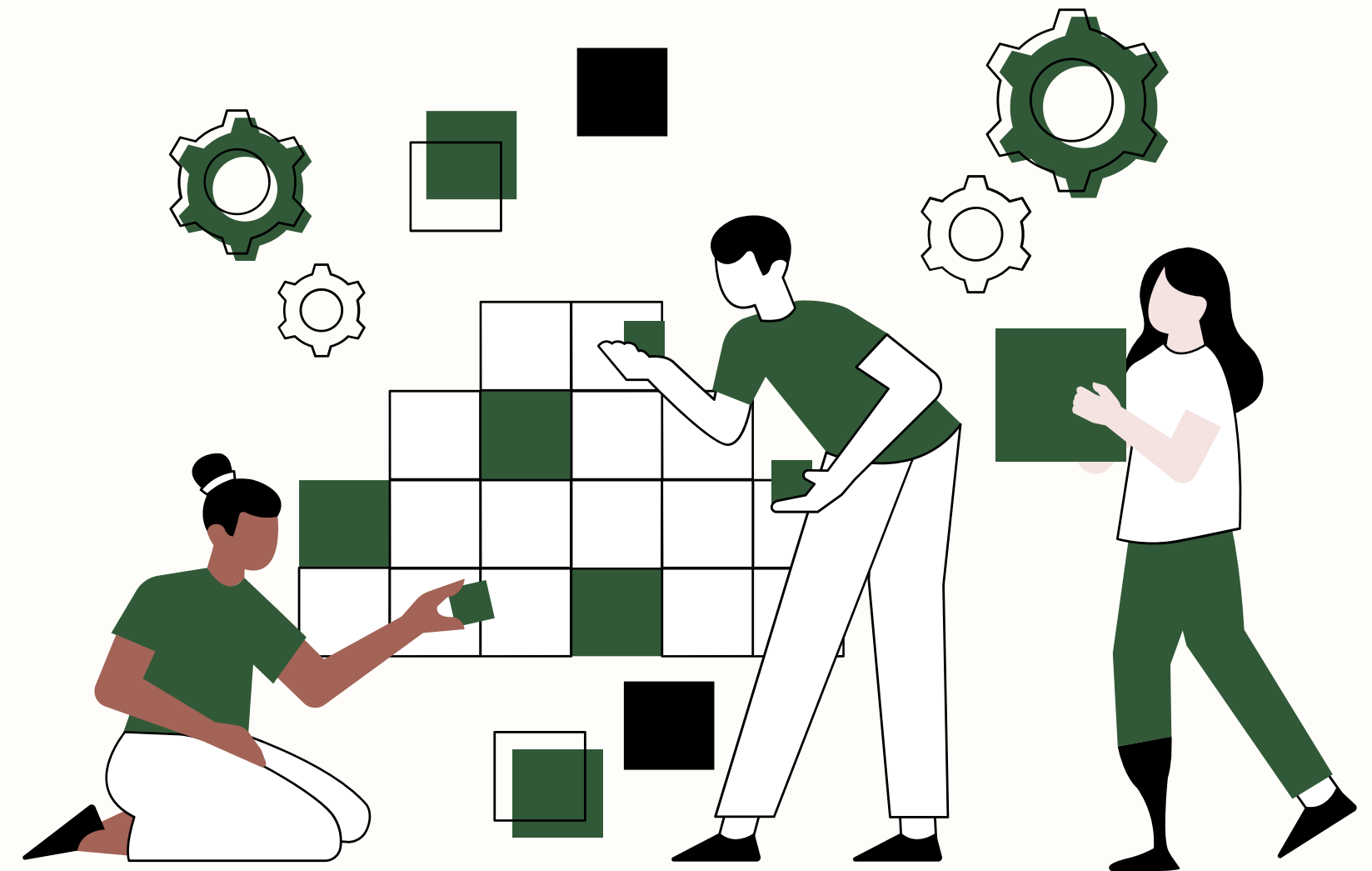


# AI-Powered Knowledge Engine for Smart Support & Ticket Resolution

## Assignment - 2

1. Real-Time Recommendation
2. Content Gap Detection

**Group 2 -**  
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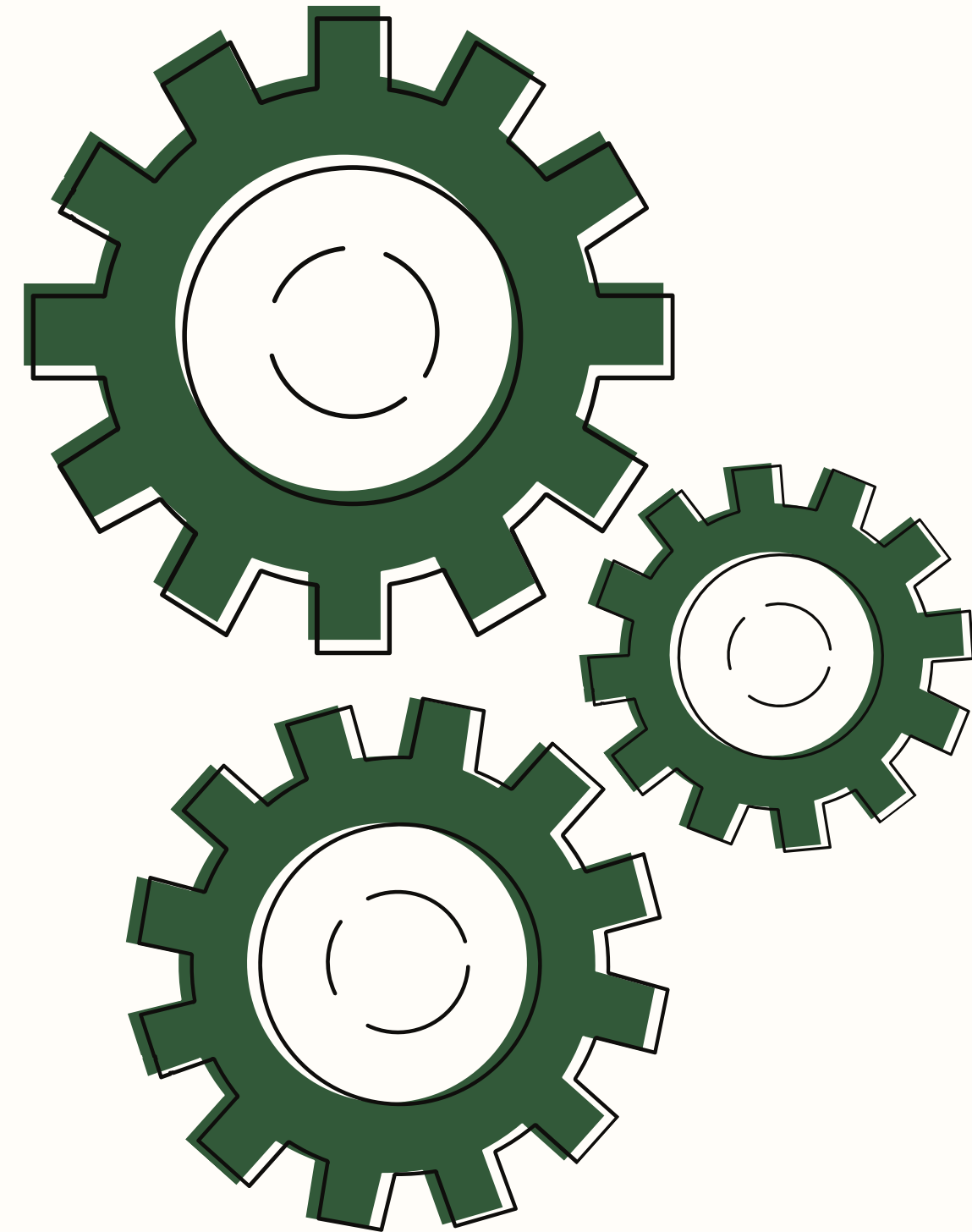
# Objective

## Goal of Assignment 2:

- To enhance the AI-powered Knowledge Engine by implementing:
- Real-Time Article Recommendation System
- Content Gap Detection & Improvement Module

## Purpose:

- To help customer support teams respond faster and improve their knowledge base quality.



# Why This Dataset?

**Dataset Used:** Tobi-Bueck/customer-support-tickets (Hugging Face)

## **Key Features:**

- body: Customer support queries
- answer: Resolved responses from support team
- priority, language: Metadata for analysis

## **Note:**

The ‘answer’ column already contains resolved ticket information , so we used it as our knowledge base.

# Real-Time Recommendation Engine

## Goal:

To recommend the most relevant solutions for new tickets in real time.

## Steps Implemented:

1. Generated embeddings for both ticket body and answer using Sentence Transformers (MiniLM-L6-v2)
2. Stored all answer embeddings in FAISS (vector database)
3. When a new query arrives:
  - Compute its embedding
  - Compare with all stored answers
  - Return top-3 most similar answers

## Result:

Instant recommendation of relevant solutions to support agents.

# Content Gap Detection Module

## Goal:

Identify missing or underrepresented topics in the knowledge base.

## Steps Implemented:

1. Tracked most frequently recommended answers
2. Used BERTopic to detect main ticket themes
3. Visualized results using Plotly bar charts

## Insight:

- Frequently used articles = high coverage topics
- Rarely used articles = potential content gaps



# Tools & Technologies Used

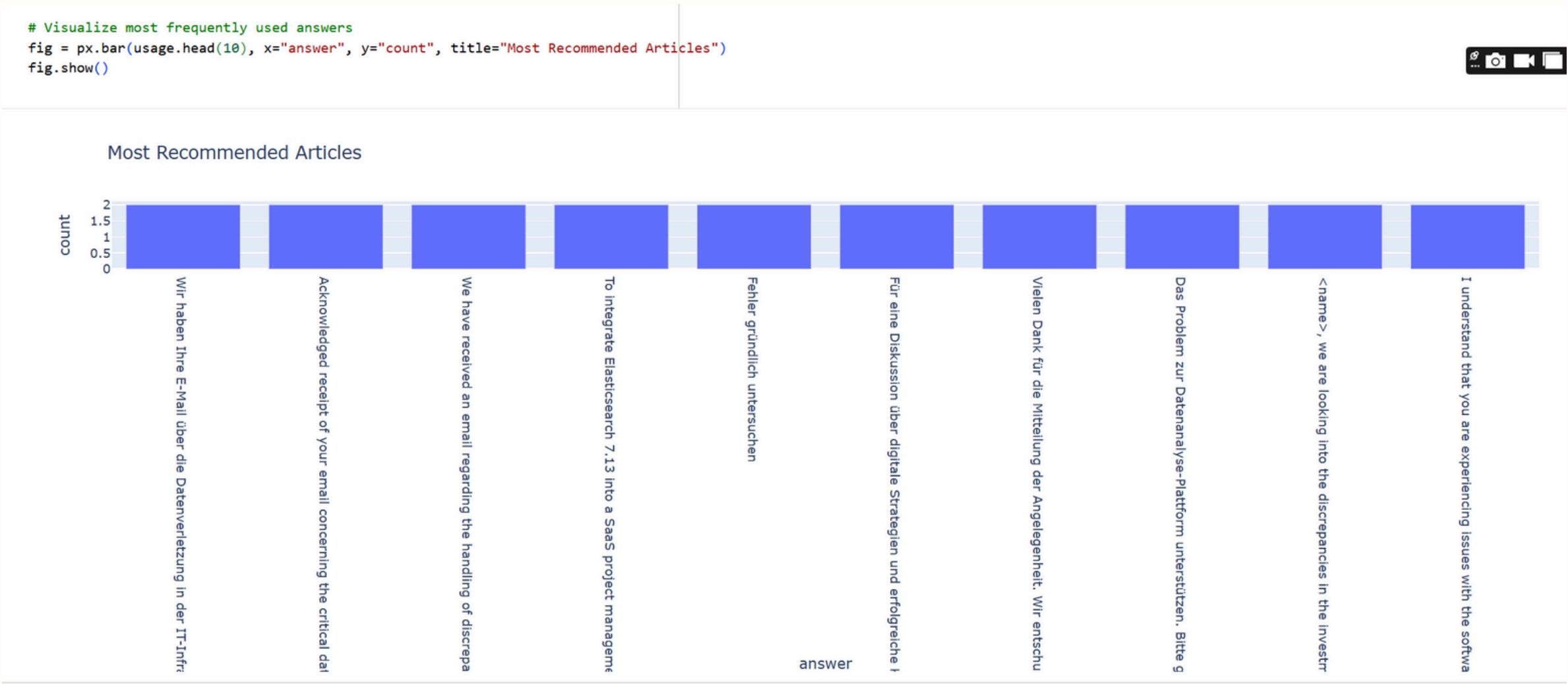
- Sentence Transformers → Embedding generation
- FAISS → Fast similarity search
- Plotly → Visualization
- BERTopic → Topic modeling & clustering
- Pandas, NumPy, scikit-learn → Data handling & analysis



# Visualization / Results

Query: My payment failed and I need a refund immediately

	body	answer	similarity
44127	I recently encountered a problem with a failed...	Dear <name>, I apologize for the payment failu...	0.658
44427	I recently ran into an unanticipated payment p...	Hello <name>, we are sorry to hear that you ar...	0.699
33915	Recently, I faced an unexpected payment proces...	Dear <name>, I regret to learn that you are fa...	0.744



# Visualization / Results

```
topic_freq.head(10)
```

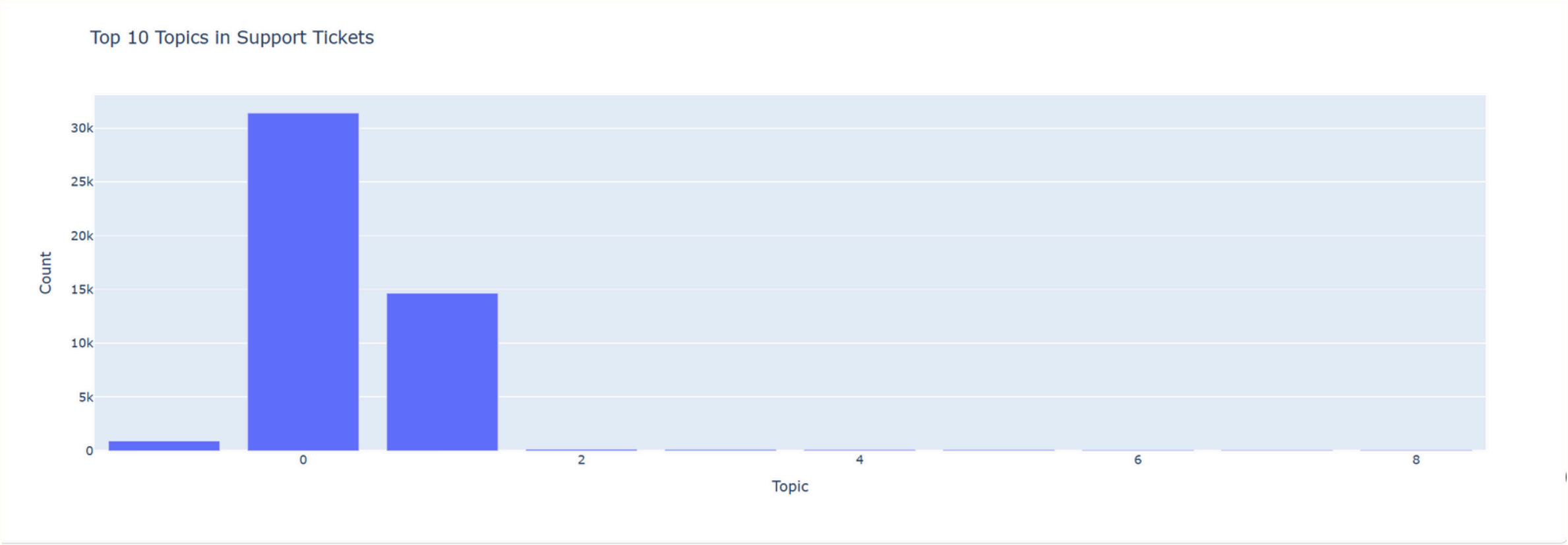
↗ Detecting topics in ticket bodies... (safe single-core mode)  
✔ Detected 43 topics successfully!

	Topic	Count
1	0	31408
0	1	14650
7	-1	898
8	2	128
15	3	110
4	4	101
13	5	95
33	6	80
9	7	78
12	8	76

Visualize Topic Coverage



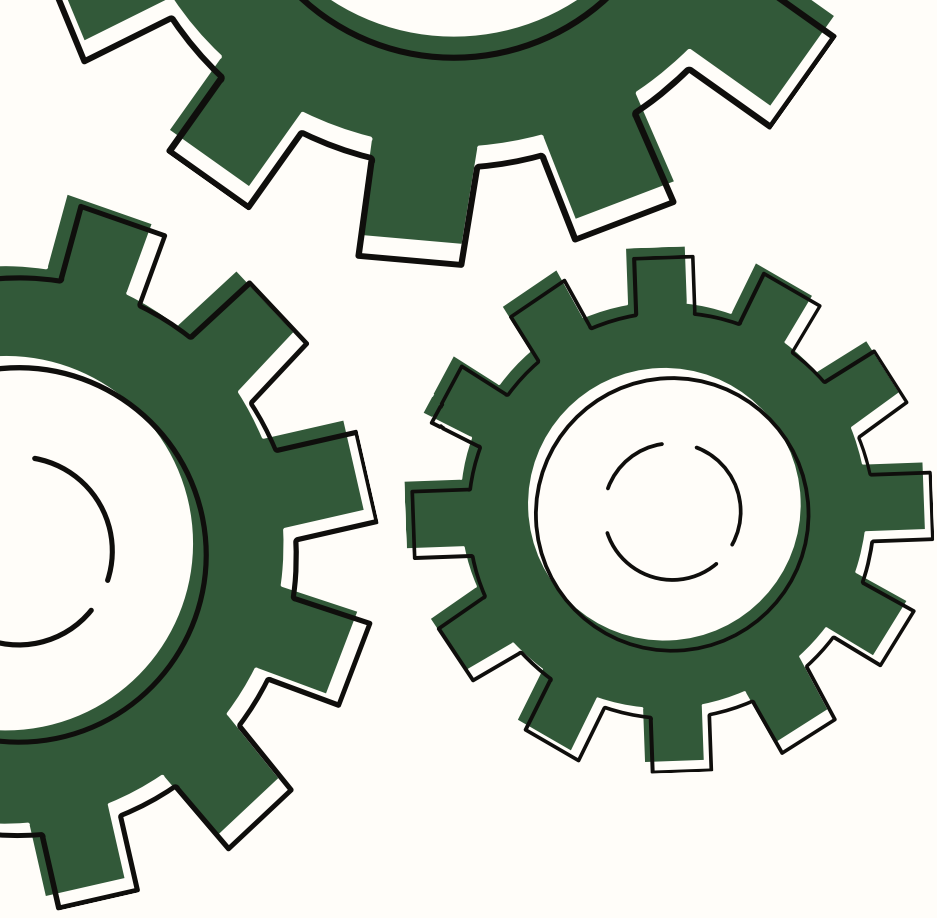
# Visualization / Results



## Evaluation Metrics:

Average Recommendation Time: 0.022 seconds  
Total Knowledge Base Articles: 48574

SUMMARY:		
Total Tickets Processed: 48574		
Topics Identified: 43		
Top Recommended Answers:		
	answer	count
0	Wir haben Ihre E-Mail über die Datenverletzung...	2
1	Acknowledged receipt of your email concerning ...	2
2	We have received an email regarding the handli...	2
3	To integrate Elasticsearch 7.13 into a SaaS pr...	2
4	Fehler gründlich untersuchen	2



Thank you!

