

Evaluation Results

I've evaluated the performance of TF-IDF and BM25 on five representative queries. For each query, I'll report the top-3 retrieved phrases.

Query	TF-IDF (Top-3)	BM25 (Top-3)
<i>Rising national debt and government spending</i>	0.471 We're going to work on national debt. 0.467 And we're also going to pay off national debt. 0.461 That's more than our national debt.	11.821 We want to stop wasteful spending and big government special interest giveaways. 10.792 We're going to work on national debt very strongly, by the way. 10.706 But to beat inflation we will stop the government spending insanity, \$1.7 trillion just approved.
<i>Causes of the US trade deficit with China</i>	0.343 We have to do something about the deficit, because we have a big trade deficit with China. 0.337 We had a trade deficit of hundreds of billions of dollars with China. 0.319 That was the deficit with China.	11.011 The US trade deficit in automobiles dropped by \$6.8 billion. 10.457 We had a trade deficit of hundreds of billions of dollars with China. 10.418 We have a trade deficit of \$300 billion with the European Union.
<i>Effects of tariffs on American consumers</i>	0.451 Kamala Harris says that a tariff is a tax on American consumers. 0.390 Today we're taking historic action to help American workers, miners, families and consumers. 0.251 Credit card debt has just reached an all-time high with American consumers owing nearly \$1 trillion.	9.470 Credit card debt has just reached an all-time high with American consumers owing nearly \$1 trillion. 7.460 Under the American first economic model, as tariffs on other countries go up, taxes on American workers and businesses will come down. 7.335 And as tariffs on foreign countries go up, taxes on American workers and families will come down.
<i>Long-term consequences of budget deficits</i>	0.398 But we're going out for long-term debt or short-term debt. 0.287 Now, Biden did a lot of very short-term debt. 0.256 But we're at a disadvantage because we had long-term deals.	9.059 Just like they found a budget surplus, we have a budget surplus of \$25 billion. 8.575 But we're going out for long-term debt or short-term debt. 8.575 But we're at a disadvantage because we had long-term deals.

Query	TF-IDF (Top-3)	BM25 (Top-3)
<i>Impact of COVID on the US economy</i>	0.360 We're going to bring a lot of companies back into the US. 0.335 The economy, people are asking me about the economy. 0.327 And they were paying hundreds of billions of dollars to the US in the form of taxes and tariffs.	9.787 That's the impact that tariffs have. 9.203 We had the most productive economy until COVID came. 8.146 I have the economy on my side.

Main Differences Between TF-IDF and BM25

- **TF-IDF:** Focuses heavily on exact token matching. Many retrieved phrases repeat the same query terms (e.g., “*national debt*”, “*deficit with China*”), but often lack context. Scores are also very close to each other, showing less differentiation.
- **BM25:** Produces more contextually relevant and diverse results. Phrases are not just keyword repeats but include additional context (e.g., “*government spending insanity*”, “*impact of tariffs on workers*”). Scores are spread out more widely, giving a clearer ranking.

Vector-Based Retrieval Results

Here I report the top-3 retrieved phrases for the same queries using FAISS and Annoy, which rely on vector similarity rather than token matching.

Query	FAISS (Top-3)	Annoy (Top-3)
<i>Impact of COVID on the US economy</i>	<p>There's never been an economy like we had and then we got hit with COVID. (distance=165.1099)</p> <p>We had the greatest economy in the history of our country in my first term, but at the end of it, we got hit with – a thing called COVID. (distance=181.4201)</p> <p>We had the greatest economy ever, then we got hit with COVID. (distance=184.6823)</p>	<p>There's never been an economy like we had and then we got hit with COVID. (distance=0.4233)</p> <p>We had the greatest economy in the history of our country in my first term, but at the end of it, we got hit with – a thing called COVID. (distance=0.4440)</p> <p>We had the greatest economy ever, then we got hit with COVID. (distance=0.4472)</p>
<i>Rising national debt and government spending</i>	<p>We're going to work on national debt. (distance=199.8177)</p> <p>We have \$35 trillion in national debt. (distance=200.0535)</p> <p>That's more than our national debt. (distance=209.7778)</p>	<p>We're going to work on national debt. (distance=0.4640)</p> <p>We have \$35 trillion in national debt. (distance=0.4660)</p> <p>That's more than our national debt. (distance=0.4741)</p>

Query	FAISS (Top-3)	Annoy (Top-3)
<i>Causes of the US trade deficit with China</i>	<p>We had a trade deficit of hundreds of billions of dollars with China. (distance=100.6701)</p> <p>We try, we have a trillion dollar trade deficit with China. (distance=113.3597)</p> <p>We have to do something about the deficit, because we have a big trade deficit with China. (distance=120.1315)</p>	<p>We had a trade deficit of hundreds of billions of dollars with China. (distance=0.3320)</p> <p>We try, we have a trillion dollar trade deficit with China. (distance=0.3524)</p> <p>We have to do something about the deficit, because we have a big trade deficit with China. (distance=0.3632)</p>
<i>Effects of tariffs on American consumers</i>	<p>That's the impact that tariffs have. (distance=129.2040)</p> <p>I think the tariffs just sort of magnified what was happening. (distance=149.7193)</p> <p>And then tariffs won't be so good for us. (distance=152.2117)</p>	<p>That's the impact that tariffs have. (distance=0.3751)</p> <p>I think the tariffs just sort of magnified what was happening. (distance=0.4032)</p> <p>And then tariffs won't be so good for us. (distance=0.4071)</p>
<i>Long-term consequences of budget deficits</i>	<p>The deficits will disappear almost overnight. (distance=193.6950)</p> <p>We have hundreds of billions of dollars worth of deficits. (distance=194.8890)</p> <p>We have hundreds of billions of dollars of deficits. (distance=200.3329)</p>	<p>The deficits will disappear almost overnight. (distance=0.4534)</p> <p>We have hundreds of billions of dollars worth of deficits. (distance=0.4560)</p> <p>We have hundreds of billions of dollars of deficits. (distance=0.4621)</p>

Differences Between Token-Based and Vector-Based Approaches

FAISS/Annoy (Vector-Based) use embeddings to represent text in continuous vector space. Retrieval is based on semantic similarity, so phrases with different wording but similar meaning are correctly retrieved. Both vector databases retrieved the same phrases, and found longer and more complex results for the queries.