

Evaluating Embedding Models for

Vector Search in E-commerce

Haystack EU

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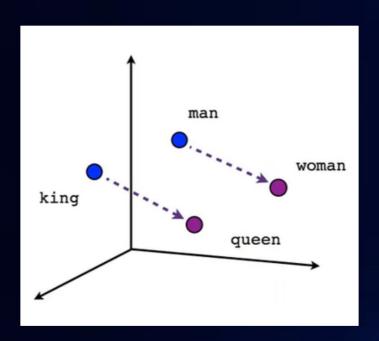
Al Foundation Model

Specifically for E-Commerce Search

Embeddings



Embeddings are...





Embeddings are...

ABSTRACT

[0.461, 0.686, 0.324, ..., 0.891]

[0.639, 0.721, 0.442, ..., 0.278]



Embeddings Models are...

IMPORTANT

nearly all vector search relevance relies on them



Embedding Models are...

HARD TO EVALUATE

- all-MiniLM-L6-v2
- bge-large-en-v1.5
- e5-large-v2
- ??????



Current evaluation method #1

- finger in the wind
- use default model

- Quick, very un-scientific
- Bad results discourage from vector search



Current evaluation method # 2

- install a model (GPU?)
- embed catalog
- run queries
- measure
- repeat (if time permits)

Very precise, but sloooooow



We need a better method!!

- Reasonably good results
- Iterate quickly



Product-Query Similarity Evaluation

- 1 product
- many queries
- similarity score for each query



Step 1: Choose 1 product / document





Step 2: Write or obtain queries



```
"Bohemian midi dress print ruffle hem",
"Boho print dress",
"Relaxed fit beach dress",
"Vintage outfit",
"Women's casualwear",
"Black dress with print",
"Business suit with tailored fit",
"Men's hiking shoes"
```



Step 3: Calculate cosine similarity scores between each query and the product



0.945234
0.883245
0.692385
0.594385
0.448571
0.814219
0.098211
0.004987

√ectr**\$tep 4: Rank queries by similarity to product**



Bohemian midi dress print ruffle hem	1
Boho print dress	2
Relaxed fit beach dress	4
Vintage outfit	5
Women's casualwear	6
Black dress with print	3
Business suit with tailored fit	7
Men's hiking shoes	8



Step 5: Ground Truth: Use an LLM (or human) to rank queries

Bohemian midi dress print ruffle hem						
Boho print dress	2					
Relaxed fit beach dress	3					
Vintage outfit	4					
Women's casualwear	5					
Black dress with print	6					
Business suit with tailored fit	7					
Men's hiking shoes	8					



Step 6: Compare



	GPT	Model
Bohemian midi dress print ruffle hem	1	1
Boho print dress	2	2
Relaxed fit beach dress	3	4
Vintage outfit	4	5
Women's casualwear	5	6
Black dress with print	6	3
Business suit with tailored fit	7	7
Men's hiking shoes	8	8

Step 6: Compare across models

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query text		Aliba	bar NI	PAR	OWE P def BAA	Swe ase ase	B B B S S S S S S S S S S S S S S S S S	Men Sinst Si	Small Small	ent k	mped ense stake	ding.0 mbed spow take Snow	16B ding flake snow lake pmrg	AB arctic salake salake fanite bring	emb arctro flake gran gante ntgra	ed-l emb arcic ie-en gran f-ste nfloa	ed m remb nbedo ie en la ba it mul nfiloa	ed gr	ong mul mg 30m v25-lal lestal- inggal- aread-ai omic nor	de la constitución de la constit	al je instri al embe comic romic romic rence t	uct ed-larg ed-text ember rans to ence-tr	nce at a second	vals ansign	Vinal School	M-L6- mpne s_mu	12 i-base itilingu	ad Nin	niLM-	112.3	5 Prog	sonnet Average
Bohemian midi dress ethnic print ruffle hem	13	3	29	9	3	13	- 4		6	40	25	29	45	17	3	1	14	2	4 2	3	44	15	4	3	1	2	3	2	1	2	i	
Boho floral patterned midi dress with flounce	41	52	10	- 1	14	10	5	5	8	24	1	3	21	10	5	4	1	1	2 2	5	30	12	2	2	2	7	5	3	3	3	- !	
Paisley and floral banded print midi dress	12		7	4	20	3	11	6	2	2	26	4	19	3	1	11	5	7	14 2	1	32	10	1	1	3	1	1	1	2	1	i	
Horizontal stripe ethnic print dress midi length	10	5	36	12	23	5	2	-1	21	14	39	7	8	25	4	2	8	3	6 3	1 38	3 42	16	14	7	4	17	8	8	10	10	- 1	
Boho ruffle hem summer dress muted colors	2	4	28	5	15	34	3	11	4	41	32	38	29	11	13	14	7	18		8 25		19	9	8	5	13	14	9	5	9		
Boho patchwork print A-line dress	4	10	20	6	31	22	21	18	40	13	23	2	15	15	15	7	6	12	10 1	2 9	25	15	16	4	6	34	25	14	8	15	i	
short sleeve midi boho dress	18	8	34	22	28	30	12	16	11	18	11	23	12	26	11	21	29	16	27	6 33	3 14	19	13	9	7	9	7	11	11	10		
Tiered ruffle hem summer dress ethnic pattern	3	14	16	8	9	8	1	2	5	21	22	12	22	9	12	10	15	20	16 1	7 16	40	14	7	6	8	3	15	6	4	7		
ruffle hem bohemian dress	24	12	22	20	2	25	28	9	9	34	13	25	17	24	29	23	20	10	8 2	2 40	19	20	3	11	9	11	11	18	9	10	1	
Bohemian A-line dress with gathered hem	22	30	1	11	6	6	10	22	12	22	17	6	2	4	14	3	11	5	1	8 30	12	12	6	5	10	16	17	7	14	11		
Relaxed fit bohemian dress ruffle bottom	20		24	30	1	19	7	4	20	15	18	16	35	12	25	8	38	15	19 4	5 42	2 1	20	15	13	11	6	13	10	13	12		
women's ethnic print dress	29		12	26	27	11	16	15	16	12	12	33	24	28	32	37	10	22	24 3	2	48	22	23	15	12	24	16	24	20	19	!	
Dark floral midi dress	14	13	26	27	32	32	20	35	14	7	8	19	30	20	17	31	23	31	38	9 12	2 15	22	22	14	13	32	10	20	22	19		
Paisley print wrap dress with ruffle	38	53	3	10	17	28	36	13	26	5	14	37	46	- 1	39	15	16	25	18 1	3 17	7 27	23	26	18	14	29	22	28	25	23	- 1	
Floral smocked waist dress with tiers	30	36	8	25	40	15	25	31	15	29	29	8	6	6	42	33	13	38	30 1	1 1	1 10	22	24	20	15	33	37	31	26	27		
Printed cotton midi dress with pleats	5	20	21	21	13	7	6	25	34	10	19	13	32	19	8	6	27	14	15	3 32	2 33	17	19	16	16	20	27	15	19	19	i	
drop waist patterned dress	40	26	37	32	8	38	9	21	1	9	15	5	3	36	10	18	25	35	37	7 20	2	20	8	10	17	27	12	13	23	16		
Relaxed fit beach dress with tribal print	8		6	38	16	12	22	10	29	23	9	9	14	18	22	12	37	17	_	0 23	3 37	20	18	12	18	21	28	16	16	18		
bohemian dress with a fringed hem	39		2	13	7	9	15	28	10	16	20	35	23	13	37	28	9	13	7 1	4 22	2 11	18	10	22	19	4	29	22	7	16	İ	
Flowy boho dress with fringe details	1	9	5	3	11	2	8	14	18	19	2	1	1	2	23	13	3	8	9 2	7 14	4 23	10	12	21	20	19	21	17	6	17		
Bohemian-style dress with fringe	16	44	4	23	12	16	32	29	39	27	21	11	5	22	33	32	19	11	3 3	0 29	9	21	11	23	21	10	32	23	12	19	i	
Earth tone boho midi dress with flounce	37		15	2	30	27	31	17	19	42	33	24	44	29	6	5	2	4	11 3		36	23	5	19	22	5	4	4	21	11	- !	
Fringed hem dress	25		11	16	5	17	30	32	13	4	4	26	27	- 8	34	34	12	32	25	2 36	8 6	19	17	25	23	36	30	29	15	25		
dress with fringed edges	33		27	7	4	18	27	39	3	- 1	7	22	10	37	35	40	4	19	13 4	0 39		20	20	26	24	25	31	30	17	25	i	
Casual geometric print tunic dress	26		13	31	34	4	33	37	25	25	35	15	18	5	19	27	31	21	29	5 34	_	22	25	17	25	41	39	32	24			
Long-sleeve paisley dress boho style	9		40	14	41	41	19	24	38	35	38	36	4	14	24	19	22	27	31 2	6	21	24	27	30	26	28	18	34	29			
Short sleeve striped midi dress in pastel colors	15	_	19	15	19	1	24	19	17	11	16	28	31	7	2	9	17	9	12	1 10	18	14	29	33	27	40	20	12	18	26		
Ethnic bohemian dress with tassels and fringes	7		43	39	18	29	13	36	41	31	28	31	9	42	7	24	36	6	5 3	6 13	41	25	28	24	28	15	36	35	27	28		
Earthy tone button-down boho dress	23	28	30	24	35	14	17	8	36	32	43	17	33	34	20	20	21	26	22 4	6 1	5 16	25	30	28	29	35	26	36	32	31	i	
Women's boho midi dress short sleeves	21			29	24	33	18	12	24	30	34	30	13	31	21	25	33	28	36	4 26	38	26	21	29	30	12	2	- 5	30			
Short sleeve bohemian dress paisley stripe	19		25	35	39	37	29	7	23	39	41	27	20	23	26	17	41	24	21 1	6 2		26	31	31	31	8	6	5	31			
Black dress with fringed hem	32		14	33	10	21	14	38	7	3	5	43	11	16	36	38	24	37	32 1	0 24	_	22	36	27	32	37	41	33	28			
bohemian midi dress	28		31	18	21	26	38	34	33	20	24	21	38	40	18	26	30	23	28 2	9 19		27	32	32	33	14	9	19	33			
Floral print maxi dress with bell sleeves	6			40	33	39	34	33	44	33	27	10	42	21	31	29	34	30		9 2		28	33	35	34	39	33	37	34			
Vintage inspired bohemian dress	27	32	32	28	36	23	37	20	31	37	30	40	39	33	9	30	26	33	17 3		29	29	34	34	35	18	24	25	35			
Long bohemian dress with side slit	36		9	41	25	20	39	26	42	28	36	41	7	30	27	16	39	36		9 28		29	35	37	36	30	34	38	36			
Boho mini dress with flared sleeves	11		38	19	22	42	23	30	37	38	10	18	26	38	30	35	28	39	39 1	8 43	_	29	37	38	37	31	38	39	37			
Vintage bohemian dress with beaded fringe	17			36	26	31	35	27	46	43	40	34	28	39	16	22	35	34		4 18		30	38	36	38	26	40	40	38			+
vintage inspired boho dress	34		_	17	43	35	26	23	28	36	31	42	36	27	40	36	18	43	40 4	1 5	39	33	39	39	39	22	23	26	39		<u> </u>	
fall dress		49		37	29	36	41	41	27	17	3	32	25	32	45	43	40		41 1	5 41		33	40	40	40	42	35	42	40			
Laboration according description	21	24	22	24	20	24	40	40	42	40	27	20	24	41	44	44	22	20	24 4	0 2	200	20	44	44	44	22	10	24	44	22	-	



Come try it out on your data!

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What makes a good embedding model for e-commerce search?



Embeddings Models are...

TRAINED ON LANGUAGE NOT PRODUCTS





An Al Foundation Model

Specifically for E-Commerce Search

Embeddings



Pre-Trained Model

Generative

Pre-trained

Transformer



World Knowledge

- has seen most products
- in different contexts
- with comments





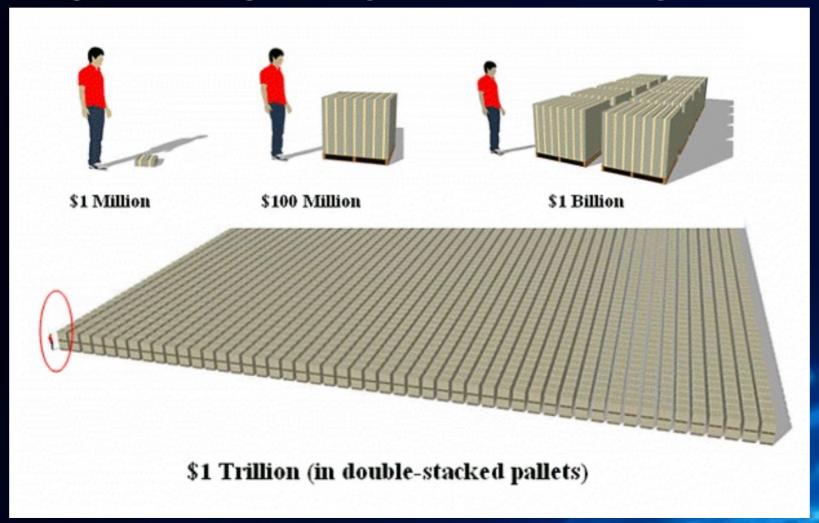
Optimized for Search

- Tiny vectors (256 dim)
- SPEED (5ms median)
- Tiny size (2.8M products in 4GB)
- Separate ulta-fast query embedder



What is different?

Large Training Data (1 Trillion Tokens)





Quality comparison



Incumbent models

["shoe","men's","red"]

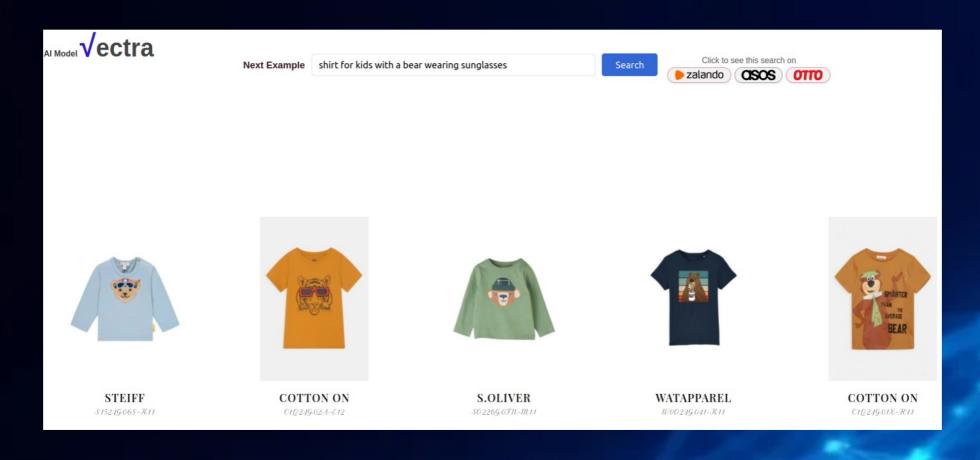


Vectra

```
},
```



ectra Shirt for kids with a bear wearing sunglasses





Quick Start

Hard to find items

Difficult queries



Bottom half of the purchase intents

- often ignored
- equal size and revenue to top half
- too complex to deal with



Implementation steps

- Append vector search result to the end
- Bubbles up on difficult queries



More Advanced Implementation

- Score threshold
- Move threshold until optimum found

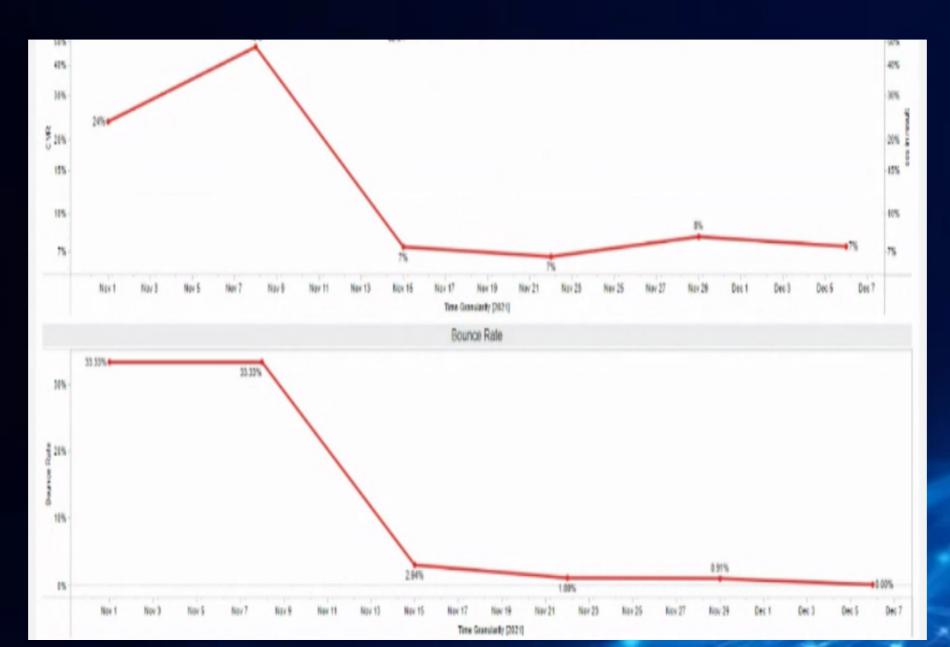


Results Example



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Search Abandonment





Get started!

- request access
- 5x cost in incremental sales **GUARANTEED**



Evaluation framework available

- Join workshop tomorrow
- API with 22 models to benchmark against



Come try it out

- Workshop tomorrow
- FREE Sponsored tickets still available





Try out our fake shop



- https://zalando.mariosbox.com
- User: esattendee
- Pass: letmein

Get In Touch

in Philippe Bouzaglou

