



SAJARI

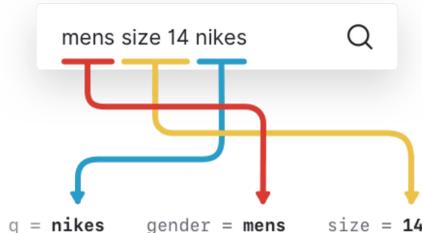
**Highly efficient dense retrieval
using neural hashes**

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Core components of great search

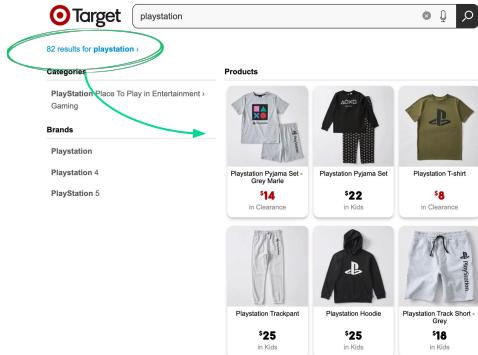
Query understanding

Modify the query to help improve the relevance process



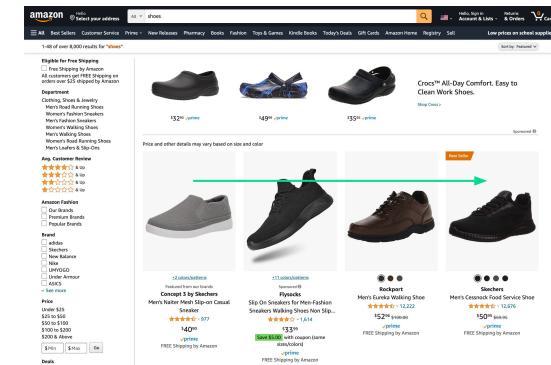
Relevance

Filter results to best match the query intent (user satisfaction)



Ranking

Order results to maximise a goal (e.g. units sold, profit, etc)



What is AI relevance?

Represent words (and images) mathematically

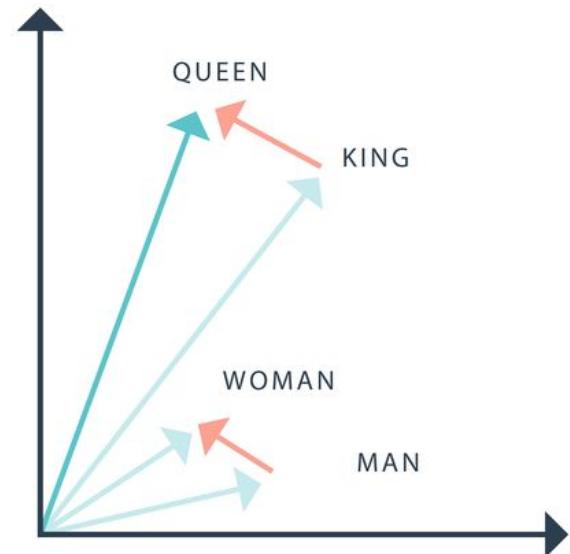
Keyword search is binary, terms either match or they don't. Synonyms and rules help to make this work ok.

AI relevance instead uses similarity. Close concepts are represented very similarly mathematically.

Learn and improve with data

Data such as purchases can be used to amplify relationships and thus continuously improve relevance.

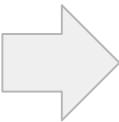
$$\text{KING} - \text{MAN} + \text{WOMAN} = \text{QUEEN}$$



The next evolution of search indexes

Keywords

2000 - present



Vectors

2013 - present



Neural hashes

2021



Next generation AI.

Extremely fast and efficient at scale, with the same result quality as vectors!

First generation AI. Better quality results, but very expensive and/or very slow at scale

Why hashes over vectors?

	Vectors	Neural hashes
Storage size	Large . Must store the vector and some kind of graph or tree based structure	Tiny . Hashes for 99% nDCG use ~10% of the vector size and there is no structure needed for storage. Can also go smaller!
Query speed	Moderate to fast . Various, but commonly need at least some float arithmetic.	Ridiculous . Simple binary bit comparison such as XOR. GPUs are not needed at all.
Data velocity	Moderate . Varies, but typically immutable, thus deletion and/or editing not supported	Great . Fits in a modified posting list. Can be inserted, modified or deleted easily. No graph or tree based structures to maintain.

Inevitable that hashes will replace vectors for dense search

Demo time!

1 cpu, 25k products → hash index = 15MB

What this does do

- Old Best Buy catalog (~25k products)
- AI based queries (universal sentence encoder vectors → neural hashes)
- Nearest neighbor lookup (ANN)
- Applies historical and/or real-time learnings to improve results

What this does not do

- No keywords or tokenization
- No language processing
- No boosting
- No rules
- No hacks
- No ranking aside from the AI driven nearest neighbor



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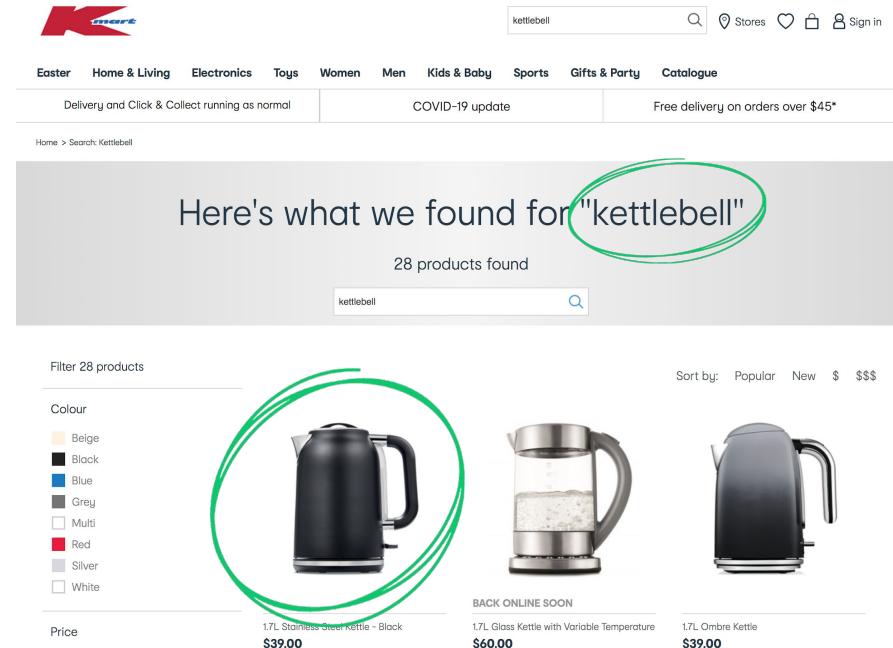
Thank you

Keep in touch: [@hamishogilvy](https://twitter.com/hamishogilvy)

Relevance is a hard problem

Today relevance is largely still determined by keywords, synonyms, stemming, stop words, rules tokenization, ...

Without **enormous human assistance** this approach works poorly...



Even for very large companies

You're shopping
Daly City ✓
OPEN until 9 pm

Delivering to
94015 ✓

fix a hole in the wall

Store Finder Truck & Tool Rental For the Pro Gift Cards Credit Services Track Order Help

My Account Lists Cart | 0 items

All Departments Home Decor, Furniture & Kitchenware DIY Projects & Ideas Project Calculators Installation & Services Specials & Offers Local Ad

Home / Text Search / fix a hole in the wall

Fix A Hole In The Wall

Search Instead for "fix a hole in the wall"

1 Results

Get It Fast

In Stock at Store Today

Daly City & nearby stores

Availability

Hide Unavailable Products

Department

Paint (1)

Patching & Repair (1)

Want more filters? First, select a department.

EbaTape Saint-Gobain ADFORS Fix it Fast Wall Hole Filler, White

★★★★★ (18) Model FBW008-U

\$3.65

Pickup
Unavailable at Daly City

Delivery
Unavailable

Add To Cart

Compare

Related Searches

plaster dry wall repair

cool my ho

cool my ho

Delivering to
94015 ✓

Cool My House

Filter & Sort

Brand ✓

Price ✓

Review Rating

20 Results

PET LIFE Small Navy Hush Puppy Electronic Heating and Cooling Smart Collapsible Pet House

\$56.99



Pickup
Free ship to store

Delivery
Free

Add To Cart

PET LIFE Beige Hush Puppy Electronic Heating and Cooling Smart Collapsible Pet House - Small

★★★★★ (1)

\$54.42