

Merchscore at Simpletire

A story about the flexibility and performance of Elastic's Painless script for customized e-commerce ranking

About us & SimpleTire

Nate Day - Relevance Engineer at OSC

Marc Pereira - Principal Operations Architect at Simpletire

SimpleTire - We think there's a better way when it comes to tire replacement. A way with lots of data, and tech, and smart thinking. From step one, to step done. A way better experience for tire replacement. That's our way. That's our promise.

Shoutouts

@SimpleTire

Jiten Modi

Kevin Klingelhoefer

Chris Vitale

Chris Daniele

Rich Zapf

Kenny Pratt

@OSC

Dan Worley

Max Irwin

Becky Billingsley



What did we want to Accomplish?

By **merchandising** our products with a data driven, personalized, testable, and dynamic real time algorithm we are able to **maximize** the experience for the customer and **increase** our conversion.

Merchandised

- Product is <u>scored</u> based on various attributes important to our users
- Attributes are <u>dynamic</u> and included in real time
- Scores capture <u>product value</u> and drive product sort
- Expand what's possible with <u>tailored</u> rankings to specific segments

Merchscore noun /mərCHskor/

A multi-component ranking function for search

Balances business and user interests to drive increased conversion



Original Recipe Merchscore

(+ + + + + ; 4 reviews) Prep time:

6 months

User Parts:

- Price
- Ratings
- Reviews

Seller Parts:

- Profit
- Sales
- Distance*

Technical details

Scheduled SQL jobs for index time inclusion (every 6 hrs)

ES results sorted by resulting Merchscore

Reasons for migrating to Elasticsearch



Speed

MySQL is slower here than Elasticsearch



Tooling

Only basic tooling exists but is not A/B test driven





Limited pre-calculated attributes available for score calculation

Painless noun /ˈpānləs/

Painless is a performant, secure scripting language designed specifically for Elasticsearch. You can use Painless to safely write inline and stored scripts anywhere scripts are supported in Elasticsearch.

Core principles: Safety, Performance, Simplicity, *Flexibility*

https://www.elastic.co/guide/en/elasticsearch/reference/master/modules-scripting-painless.html

Step 1: Logic as Painless scripts

Is it possible to encode the business logic into ES?



Step 1: Painless is flexible

Price score:

Min-max normalized price by tire size.

Runs a pre-score agg and pass results in with params

```
PRE:
"aggs": {
    "priceMin": {"min": {"field": "price"} },
    "priceMax": {"max": { "field": "price"} }
}
```

```
"script_score": {
    "query": { "exists": {"field": "price"} },
    "script": {
        "source": """
    double myScore = (1- ((doc['price'].value -
        params['priceMin']) / (params['priceMax'] -
        params['priceMin']))) * 0.05;
```

```
return ( (myScore > 0) ? myScore : 0)
"""
```

Step 1: Painless is double jointed

Distance-margin score:

Products within **X** miles & having > **Y** margin (in descending order by margin) Followed by those that are > **X** miles or < **Y** margin (in ascending order by distance)

Params are passed for user's lat/lon, margin and distance cutoffs



Step 1: recap



Step 2: weight components

Big win for flexibility/testing





Step 2: use params to carry weights

Template reuse FTW

```
"script_score": {
    "query": {
        "exists": {"field": "averageRating"}
    },
    "script": {
        "source": """
            ((doc['averageRating'].value > 4.9) ? 1
        : 0) * params['weight'];
        .....
            ,
        "params": {
             "weight": 0.25
        }
```

Step 3: "index"/compile scripts

Save compile time

Treat it like another index command

```
POST scripts/rating score
  "script":
    "lang": "painless",
  "source": "((doc['averageRating'].value > 4.9) ? 1 : 0)
params['weight']"
GET search/
"script_score":
         "query": {
    "exists": {"field": "averageRating"}
   },
"script": {
    "id";
           "id": "rating score",
           "params": {"weight": 0.25}
}
```

Step 4: "bool should" wraps parts







A lifted bottom line

+ 3% increase on conversion rate



Source: Monster Truck Vectors by Vecteezy

Curations: customized clones



Curation Merchscores

Curations: Netflix style browsing

Most Popular In Your Location

Top choices from drivers near you

Most Popular Merchscore



NITTO \$161.00



MILESTAR \$179.96 4440.00 Patamotis M/T (210 0 mi Warranty 8 Mud Terrain ***** (244)



\$127.96 600.00

Trail Guide A/T 1155

0 mi Warranty

A All Terrain

***** (1)



\$152.96 4001.00

Wrangler AT/5 1135

0 mi Warranty

All Terrain

***** (20)







AMERICUS



\$156.00 4040.00 Crusse HT51 HST 70000 mi Warranty # All Season ***** (175)





CAVENON POWER \$149.30 4440.00 Terra Hunter X/T 1955 mi Warranty All Terrain ***** (12)





FEDERAL \$124.96 6404.60

\$118.97 4444.00 A/T HAT 0 mi Warranty @ All Season

Best Value Merchscore



SIGMA

\$127.96 600.00

Trail Guide A/T 1155

0 mi Warranty

🖄 All Terrain

***** 00

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Best Rated Affordable Tires 1,000's of ratings from verified customers in your area

GOODFVEAR

\$152.96 4004.00 Wrangler AT/S 1135 0 mi Warranty All Terrain ***** (20)







\$149.30 4440.00 Terra Hunter X/T 1155 mi Warranty A All Terrain ***** (82)



KUNHO TIRE \$156.00 4040.00 Crugen HTS1 113T 70000 mi Warranty All Season ***** (175)

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*

i Highway ***** (42)



C. 10 (2) (2) ***** (110)

CT MADIAL \$110.00 44444 Savero HT2 113T 50000 mi Warranty





Curations





+ 1% on conversion rate



Source: <u>@_LiftedTrucks_</u>on Twitter

In prod:

oduction Performance

Performance

> How do I use these metrics?













ELASTICSEARCH

| Hot storage | 900 GB |
|-----------------|----------|
| Hot memory | 30 GB |
| Master memory ③ | 1 GB |
| Hourly rate | \$0.6953 |
| KIBANA | |
| Memory | 1 GB |
| Hourly rate | FREE |
| TOTAL | |
| Total storage | 900 GB |
| Total memory | 32 GB |
| Hourly rate | \$0.6953 |

* Data transfer and snapshot storage fees may apply.

Architecture

Hourly rate



aws.data.highio.i3

Hot data · Content · Master · Ingest · Coordinating 450 GB Storage



+15% Cost

ELASTICSEARCH

| Hot storage | 240 GB |
|-----------------|----------|
| Hot memory | 30 GB |
| Master memory ③ | 1 GB |
| Hourly rate | \$0.8723 |
| KIBANA | |
| Memory | 1 GB |
| Hourly rate | FREE |

TOTAL

| Total storage | 240 GB |
|---------------|----------|
| Total memory | 32 GB |
| Hourly rate | \$0.8723 |

* Data transfer and snapshot storage fees may apply.

Architecture



In prod: trivia question





In prod: trivia answer



Target specific browsing profiles with specific signals

Layer on a tailored Merchscore as a rescore query

- This is a tweak to the baseline Merchscore designed to elevate a specific segment of the results

Target specific browsing profiles with specific signals

Customers that search for a specific size <u>235-60r18</u> but are looking at different brands:

Tier 1, Brand = Michelin

https://simpletire.com/brands/michelin-tires/energy-saver-a-s

https://simpletire.com/tire-sizes/235-60r18

Tier 3, Brand = Atturo

https://simpletire.com/brands/atturo-tires/aw730

https://simpletire.com/tire-sizes/235-60r18

User searches for size 235-60r18 without personalization

Best Rated

Highly rated by verified customers in PA



User visits the Michelin brand page or is directed there via an ad.



User searches for size 235-60r18 having brand=Michelin

Best Rated

Highly rated by verified customers in PA



User visits the Atturo brand page or is directed there via an ad.



Q Search by vehicle or tire size

Browse tires Deals Learn 📀 Huntingdon Valley, PA 🖇 🥵

Home > All brands > Atturo



Based in Illinois, Atturo began operations in 2009 with a focus on high-quality light truck and SUV tires. Designed for adventure, Atturo is recognized as an expert in the SUV and 4×4... Read more \sim



User searches for size 235-60r18 having brand=Atturo

Best Rated

Highly rated by verified customers in PA





| Showing 201 results for tire Size 235-60-18 | Michel | lin | Ti | er 1 | |
|---|--------|------------|---|------|---|
| | | Convex 🗍 | 6000/FELM \$222.98 Minim Answaren CS Fiel Man 2254/05/8 Physics, papilotic + 10 of 8-1 day addrey | Tier | 1 |
| | SR | Conges (| FIRELLI \$238.99 Immo Sception Vende Al Sea 235.95498 Play new, pap later 17 off Bit 1 day Addrey | Tier | 1 |
| | | Company 🗌 | Galinenial \$184.96 Eastas ProContact TX > 225.95698 R - Jay Inter + 2108 R - Jay Inter + 2108 | Tier | 1 |
| | R | Gompans 🗌 | State CLA \$189.96 Motor Scorpion Worker - 1 Scorpion Worker - 1 Scorpion Worker - 1 Physics, page later - 1 addr B: 1 day addresy | Tier | 1 |
| | S | Conyes . | FIGURE LE \$190.99 tonat Scapita Varia > 224.0008 Bit tay followy | Tier | 1 |
| | | Company [] | Firestone \$161.97 same Destination L82 > Play rook, par later + 15 at Bit 1 day addresy | Tier | 2 |
| | 62 | Company [| VCKCHAMA \$163.97 basis Add Accord 5 223/4008 B 244y dology | Tier | 2 |
| | | Company [] | SCEPTOR \$100.97 bitos CG > P255V0455 Bit Facy advery | Tier | 3 |
| | | Conpex | \$117.99 2.897 > 2.550000 #hon non, pop loter = 0.500 Bit - day delawy | Tier | 2 |
| | | Company 🗍 | \$165.99 | Tier | 2 |

| Mattur | o Tie | er 3 | |
|--|---|------|---|
| | Company SCOPTOR \$100.97 Paskedos B. bday advary | Tier | 3 |
| | Compare Control Contro | Tier | 3 |
| | Contains | Tier | 3 |
| | Convers D Lattiffer \$130.97 betwee Iffice UWH > 255/5616 B > day adivey | Tier | 3 |
| | Compare Contention of Contenti | Tier | 2 |
| () () () () () () () () () () () () () (| Connexes | Tier | 3 |
| | Compare Concellers \$112.96 Minutes Passwootes R 2 May remo, per Jan R 2 May remo, per Jan | Tier | 3 |
| | Cumpany () \$115.96 MANTED > 255-00 Hits Party rank, pape lan Be "Hate software | Tier | 3 |
| | Compare OHTSUITance \$104.96 Lissas P70000 1 P33460508 Page of the set of the | Tier | 3 |

The **most** lift

+ 5% on conversions with personalization



Source: Grave Digger by Kazvorpal



We are hiring!

simpletire.applytojob.com



Stackable promo! 5% off on top of any promo

HAYSTACK5



Appendix