主讲老师： Fox

> 有道笔记地址： https://note.youdao.com/s/3i9J045U

1.ElasticSearch回顾

ElasticSearch（简称ES）是一个分布式、RESTful 风格的搜索和数据分析引擎，是用Java开发并且是
当前最流行的开源的企业级搜索引擎，能够达到近实时搜索，稳定，可靠，快速，安装使用方便。
客户端支持Java、.NET（C#）、PHP、Python、Ruby等多种语言。
官方网站: https://www.elastic.co/
下载地址： https://www.elastic.co/cn/downloads/past-releases#elasticsearch

应用场景

- 站内搜索
- 日志管理与分析
- 大数据分析
- 应用性能监控
- 机器学习

1.1 业务场景——图灵商城商品搜索

根据关键字查询、根据品牌查询、商品类别、商品属性信息、价格区间、是否有库存、排序(销量、价
格、上架时间等)

1.2 文档建模

商品json文档

```
1  {
```

```json
    "id": "26",
    "name": "小米 11 手机",
    "keywords": "小米手机",
    "subTitle": "AI智慧全面屏 6GB +64GB 亮黑色 全网通版 移动联通电信4G手机 双卡双待 双卡双待",
    "price": "3999",
    "promotionPrice": "2999",
    "originalPrice": "5999",
    "pic": "http://macro-oss.oss-cn-shenzhen.aliyuncs.com/mall/images/20180615/xiaomi.jpg",
    "sale": 999,
    "hasStock": true,
    "salecount":999,
    "putawayDate":"2021-04-01",
    "brandId": 6,
    "brandName": "小米",
    "brandImg": "http://macro-oss.oss-cn-shenzhen.aliyuncs.com/mall/images/20190129/1e34aef2a409119018a4c6258e39ecfb_222_222.png",
    "categoryId": 19,
    "categoryName": "手机通讯",
    "attrs": [
      {
        "attrId": 1,
        "attrName": "cpu",
        "attrValue": "2核"
      },
      {
        "attrId": 2,
        "attrName": "颜色",
        "attrValue": "黑色"
      }
    ]
}

{
    "id": "30",
    "name": "HLA海澜之家简约动物印花短袖T恤",
    "keywords": "海澜之家衣服",
    "subTitle": "HLA海澜之家短袖T恤",
    "price": "199",
    "promotionPrice": "99",
```

```
40        "originalPrice": "299",
41        "pic": "http://macro-oss.oss-cn-
    shenzhen.aliyuncs.com/mall/images/20180615/5ad83a4fN6ff67ecd.jpg!cc_350x449.jpg",
42        "sale": 999,
43        "hasStock": true,
44        "salecount":19,
45        "putawayDate":"2021-04-05",
46        "brandId": 50,
47        "brandName": "海澜之家",
48        "brandImg": "http://macro-oss.oss-cn-
    shenzhen.aliyuncs.com/mall/images/20190129/99d3279f1029d32b929343b09d3c72de_222_222.jpg
    ",
49        "categoryId": 8,
50        "categoryName": "T恤",
51        "attrs": [
52          {
53            "attrId": 3,
54            "attrName": "尺寸",
55            "attrValue": "M"
56          },
57          {
58            "attrId": 4,
59            "attrName": "颜色",
60            "attrValue": "黑色"
61          }
62        ]
63    }
```

建模分析：

- name，keywords，subTitle 需要使用中文分词器
- categoryName，brandName 类型可以为keyword
- 不同的商品其属性也不同，属性和商品之间存在关联关系。商品属性attrs不会频繁更新，可以选择使用nested类型

思考：Elasticsearch中如何处理关联关系?

定义mapping，创建索引库

```
1  PUT product_db
```

```json
{
  "mappings": {
    "properties": {
      "id": {
        "type": "long"
      },
      "name": {
        "type": "text",
        "analyzer": "ik_max_word"
      },
      "keywords": {
        "type": "text",
        "analyzer": "ik_max_word"
      },
      "subTitle": {
        "type": "text",
        "analyzer": "ik_max_word"
      },
      "salecount":{
        "type": "long"
      },
       "putawayDate":{
        "type": "date"
      },
      "price": {
        "type": "double"
      },

      "promotionPrice": {
        "type": "keyword"
      },
      "originalPrice": {
        "type": "keyword"
      },
      "pic": {
        "type": "keyword"
      },
      "sale": {
        "type": "long"
      },
```

```
42          "hasStock": {
43            "type": "boolean"
44          },
45          "brandId": {
46            "type": "long"
47          },
48          "brandName": {
49            "type": "keyword"
50          },
51          "brandImg": {
52            "type": "keyword"
53          },
54          "categoryId": {
55            "type": "long"
56          },
57          "categoryName": {
58            "type": "keyword"
59          },
60          "attrs": {
61            "type": "nested",
62            "properties": {
63              "attrId": {
64                "type": "long"
65              },
66              "attrName": {
67                "type": "keyword"
68              },
69              "attrValue": {
70                "type": "keyword"
71              }
72            }
73          }
74        }
75      }
76  }
77
```

1.3 索引文档

可以利用canal进行数据同步

```
1   PUT /product_db/_doc/1
2   {
3     "id": "26",
4     "name": "小米 11 手机",
5     "keywords": "小米手机",
6     "subTitle": "AI智慧全面屏 6GB +64GB 亮黑色 全网通版 移动联通电信4G手机 双卡双待 双卡双待",
7     "price": "3999",
8     "promotionPrice": "2999",
9     "originalPrice": "5999",
10    "pic": "http://macro-oss.oss-cn-
      shenzhen.aliyuncs.com/mall/images/20180615/xiaomi.jpg",
11    "sale": 999,
12    "hasStock": true,
13    "salecount":999,
14    "putawayDate":"2021-04-01",
15    "brandId": 6,
16    "brandName": "小米",
17    "brandImg": "http://macro-oss.oss-cn-
      shenzhen.aliyuncs.com/mall/images/20190129/1e34aef2a409119018a4c6258e39ecfb_222_222.png
      ",
18    "categoryId": 19,
19    "categoryName": "手机通讯",
20    "attrs": [
21      {
22        "attrId": 1,
23        "attrName": "cpu",
24        "attrValue": "2核"
25      },
26      {
27        "attrId": 2,
28        "attrName": "颜色",
29        "attrValue": "黑色"
30      }
31    ]
32  }
33
```

```
34  PUT /product_db/_doc/2
35  {
36      "id": "27",
37      "name": "小米 10 手机",
38      "keywords": "小米手机",
39      "subTitle": "AI智慧全面屏 4GB +64GB 亮白色 全网通版 移动联通电信4G手机 双卡双待 双卡双待",
40      "price": "2999",
41      "promotionPrice": "1999",
42      "originalPrice": "3999",
43      "pic": "http://macro-oss.oss-cn-
    shenzhen.aliyuncs.com/mall/images/20180615/xiaomi.jpg",
44      "sale": 999,
45      "hasStock": false,
46      "salecount":99,
47      "putawayDate":"2021-04-02",
48      "brandId": 6,
49      "brandName": "小米",
50      "brandImg": "http://macro-oss.oss-cn-
    shenzhen.aliyuncs.com/mall/images/20190129/1e34aef2a409119018a4c6258e39ecfb_222_222.png
    ",
51      "categoryId": 19,
52      "categoryName": "手机通讯",
53      "attrs": [
54          {
55              "attrId": 1,
56              "attrName": "cpu",
57              "attrValue": "4核"
58          },
59          {
60              "attrId": 2,
61              "attrName": "颜色",
62              "attrValue": "白色"
63          }
64      ]
65  }
66  PUT /product_db/_doc/3
67  {
68      "id": "28",
69      "name": "小米  手机",
70      "keywords": "小米手机",
```

```
71      "subTitle": "AI智慧全面屏 4GB +64GB 亮蓝色 全网通版 移动联通电信4G手机 双卡双待 双卡双待",
72      "price": "2999",
73      "promotionPrice": "1999",
74      "originalPrice": "3999",
75      "pic": "http://macro-oss.oss-cn-
   shenzhen.aliyuncs.com/mall/images/20180615/xiaomi.jpg",
76      "sale": 999,
77      "hasStock": true,
78      "salecount":199,
79      "putawayDate":"2021-04-03",
80      "brandId": 6,
81      "brandName": "小米",
82      "brandImg": "http://macro-oss.oss-cn-
   shenzhen.aliyuncs.com/mall/images/20190129/1e34aef2a409119018a4c6258e39ecfb_222_222.png
   ",
83      "categoryId": 19,
84      "categoryName": "手机通讯",
85      "attrs": [
86        {
87          "attrId": 1,
88          "attrName": "cpu",
89          "attrValue": "2核"
90        },
91        {
92          "attrId": 2,
93          "attrName": "颜色",
94          "attrValue": "蓝色"
95        }
96      ]
97    }
98  PUT /product_db/_doc/4
99  {
100     "id": "29",
101     "name": "Apple iPhone 8 Plus 64GB 金色特别版 移动联通电信4G手机",
102     "keywords": "苹果手机",
103     "subTitle": "苹果手机 Apple产品年中狂欢节，好物尽享，美在智慧！速来 >> 勾选[保障服务][原厂
   保2年]，获得AppleCare+全方位服务计划，原厂延保售后无忧。",
104     "price": "5999",
105     "promotionPrice": "4999",
106     "originalPrice": "7999",
```

```
107      "pic": "http://macro-oss.oss-cn-
      shenzhen.aliyuncs.com/mall/images/20180615/5acc5248N6a5f81cd.jpg",
108      "sale": 999,
109      "hasStock": true,
110      "salecount":1199,
111      "putawayDate":"2021-04-04",
112      "brandId": 51,
113      "brandName": "苹果",
114      "brandImg": "http://macro-oss.oss-cn-
      shenzhen.aliyuncs.com/mall/images/20180607/timg.jpg",
115      "categoryId": 19,
116      "categoryName": "手机通讯",
117      "attrs": [
118        {
119          "attrId": 1,
120          "attrName": "cpu",
121          "attrValue": "4核"
122        },
123        {
124          "attrId": 2,
125          "attrName": "颜色",
126          "attrValue": "金色"
127        }
128      ]
129  }
130  PUT /product_db/_doc/5
131  {
132      "id": "30",
133      "name": "HLA海澜之家简约动物印花短袖T恤",
134      "keywords": "海澜之家衣服",
135      "subTitle": "HLA海澜之家短袖T恤",
136      "price": "199",
137      "promotionPrice": "99",
138      "originalPrice": "299",
139      "pic": "http://macro-oss.oss-cn-
      shenzhen.aliyuncs.com/mall/images/20180615/5ad83a4fN6ff67ecd.jpg!cc_350x449.jpg",
140      "sale": 999,
141      "hasStock": true,
142      "salecount":19,
143      "putawayDate":"2021-04-05",
```

```
144      "brandId": 50,
145      "brandName": "海澜之家",
146      "brandImg": "http://macro-oss.oss-cn-
         shenzhen.aliyuncs.com/mall/images/20190129/99d3279f1029d32b929343b09d3c72de_222_222.jpg
         ",
147      "categoryId": 8,
148      "categoryName": "T恤",
149      "attrs": [
150        {
151          "attrId": 3,
152          "attrName": "尺寸",
153          "attrValue": "M"
154        },
155        {
156          "attrId": 4,
157          "attrName": "颜色",
158          "attrValue": "黑色"
159        }
160      ]
161  }
162  PUT /product_db/_doc/6
163  {
164      "id": "31",
165      "name": "HLA海澜之家蓝灰花纹圆领针织布短袖T恤",
166      "keywords": "海澜之家衣服",
167      "subTitle": "HLA海澜之家短袖T恤",
168      "price": "299",
169      "promotionPrice": "199",
170      "originalPrice": "299",
171      "pic": "http://macro-oss.oss-cn-
         shenzhen.aliyuncs.com/mall/images/20180615/5ac98b64N70acd82f.jpg!cc_350x449.jpg",
172      "sale": 999,
173      "hasStock": true,
174      "salecount":399,
175      "putawayDate":"2021-04-06",
176      "brandId": 50,
177      "brandName": "海澜之家",
178      "brandImg": "http://macro-oss.oss-cn-
         shenzhen.aliyuncs.com/mall/images/20190129/99d3279f1029d32b929343b09d3c72de_222_222.jpg
         ",
179      "categoryId": 8,
```

```
180    "categoryName": "T恤",
181    "attrs": [
182      {
183        "attrId": 3,
184        "attrName": "尺寸",
185        "attrValue": "X"
186      },
187      {
188        "attrId": 4,
189        "attrName": "颜色",
190        "attrValue": "蓝灰"
191      }
192    ]
193  }
194  PUT /product_db/_doc/7
195  {
196    "id": "32",
197    "name": "HLA海澜之家短袖T恤男基础款",
198    "keywords": "海澜之家衣服",
199    "subTitle": "HLA海澜之家短袖T恤",
200    "price": "269",
201    "promotionPrice": "169",
202    "originalPrice": "399",
203    "pic": "http://macro-oss.oss-cn-
    shenzhen.aliyuncs.com/mall/images/20180615/5a51eb88Na4797877.jpg",
204    "sale": 999,
205    "hasStock": true,
206    "salecount":399,
207    "putawayDate":"2021-04-07",
208    "brandId": 50,
209    "brandName": "海澜之家",
210    "brandImg": "http://macro-oss.oss-cn-
    shenzhen.aliyuncs.com/mall/images/20190129/99d3279f1029d32b929343b09d3c72de_222_222.jpg
    ",
211    "categoryId": 8,
212    "categoryName": "T恤",
213    "attrs": [
214      {
215        "attrId": 3,
216        "attrName": "尺寸",
```

```
217           "attrValue": "L"
218         },
219         {
220           "attrId": 4,
221           "attrName": "颜色",
222           "attrValue": "蓝色"
223         }
224       ]
225    }
226  PUT /product_db/_doc/8
227    {
228       "id": "33",
229       "name": "小米（MI）小米电视4A ",
230       "keywords": "小米电视机家用电器",
231       "subTitle": "小米（MI）小米电视4A 55英寸 L55M5-AZ/L55M5-AD 2GB+8GB HDR 4K超高清  人工智能
        网络液晶平板电视",
232       "price": "2269",
233       "promotionPrice": "2169",
234       "originalPrice": "2399",
235       "pic": "http://macro-oss.oss-cn-
        shenzhen.aliyuncs.com/mall/images/20180615/5b02804dN66004d73.jpg",
236       "sale": 999,
237       "hasStock": true,
238       "salecount":132,
239       "putawayDate":"2021-04-09",
240       "brandId": 6,
241       "brandName": "小米",
242       "brandImg": "http://macro-oss.oss-cn-
        shenzhen.aliyuncs.com/mall/images/20190129/1e34aef2a409119018a4c6258e39ecfb_222_222.png
        ",
243       "categoryId": 35,
244       "categoryName": "手机数码",
245       "attrs": [
246         {
247           "attrId": 5,
248           "attrName": "屏幕尺寸",
249           "attrValue": "52"
250         },
251         {
252           "attrId": 6,
253           "attrName": "机身颜色",
```

```
254        "attrValue": "黑色"
255      }
256    ]
257  }
258  PUT /product_db/_doc/9
259  {
260    "id": "34",
261    "name": "小米（MI）小米电视4A 65英寸",
262    "keywords": "小米电视机家用电器",
263    "subTitle": "小米（MI）小米电视4A 65英寸 L55M5-AZ/L55M5-AD 2GB+8GB HDR 4K超高清 人工智能
      网络液晶平板电视",
264    "price": "3269",
265    "promotionPrice": "3169",
266    "originalPrice": "3399",
267    "pic": "http://macro-oss.oss-cn-
      shenzhen.aliyuncs.com/mall/images/20180615/5b028530N51eee7d4.jpg",
268    "sale": 999,
269    "hasStock": true,
270    "salecount":999,
271    "putawayDate":"2021-04-10",
272    "brandId": 6,
273    "brandName": "小米",
274    "brandImg": "http://macro-oss.oss-cn-
      shenzhen.aliyuncs.com/mall/images/20190129/1e34aef2a409119018a4c6258e39ecfb_222_222.png
      ",
275    "categoryId": 35,
276    "categoryName": "手机数码",
277    "attrs": [
278      {
279        "attrId": 5,
280        "attrName": "屏幕尺寸",
281        "attrValue": "65"
282      },
283      {
284        "attrId": 6,
285        "attrName": "机身颜色",
286        "attrValue": "金色"
287      }
288    ]
289  }
290  PUT /product_db/_doc/10
```

```
291  {
292     "id": "35",
293     "name": "耐克NIKE 男子 休闲鞋 ROSHE RUN 运动鞋 511881-010黑色41码",
294     "keywords": "耐克运动鞋 鞋子",
295     "subTitle": "耐克NIKE 男子 休闲鞋 ROSHE RUN 运动鞋 511881-010黑色41码",
296     "price": "569",
297     "promotionPrice": "369",
298     "originalPrice": "899",
299     "pic": "http://macro-oss.oss-cn-
     shenzhen.aliyuncs.com/mall/images/20180615/5b235bb9Nf606460b.jpg",
300     "sale": 999,
301     "hasStock": true,
302     "salecount":399,
303     "putawayDate":"2021-04-11",
304     "brandId": 58,
305     "brandName": "NIKE",
306     "brandImg": "http://macro-oss.oss-cn-shenzhen.aliyuncs.com/mall/images/20180615/timg
     (51).jpg",
307     "categoryId": 29,
308     "categoryName": "男鞋",
309     "attrs": [
310       {
311         "attrId": 7,
312         "attrName": "尺码",
313         "attrValue": "42"
314       },
315       {
316         "attrId": 8,
317         "attrName": "颜色",
318         "attrValue": "黑色"
319       }
320     ]
321  }
322  PUT /product_db/_doc/11
323  {
324     "id": "36",
325     "name": "耐克NIKE 男子 气垫 休闲鞋 AIR MAX 90 ESSENTIAL 运动鞋 AJ1285-101白色41码",
326     "keywords": "耐克运动鞋 鞋子",
327     "subTitle": "AIR MAX 90 ESSENTIAL 运动鞋 AJ1285-101白色",
328     "price": "769",
```

```
329      "promotionPrice": "469",
330      "originalPrice": "999",
331      "pic": "http://macro-oss.oss-cn-
      shenzhen.aliyuncs.com/mall/images/20180615/5b19403eN9f0b3cb8.jpg",
332      "sale": 999,
333      "hasStock": true,
334      "salecount":499,
335      "putawayDate":"2021-04-13",
336      "brandId": 58,
337      "brandName": "NIKE",
338      "brandImg": "http://macro-oss.oss-cn-shenzhen.aliyuncs.com/mall/images/20180615/timg
      (51).jpg",
339      "categoryId": 29,
340      "categoryName": "男鞋",
341      "attrs": [
342          {
343              "attrId": 7,
344              "attrName": "尺码",
345              "attrValue": "44"
346          },
347          {
348              "attrId": 8,
349              "attrName": "颜色",
350              "attrValue": "白色"
351          }
352      ]
353  }
354  PUT /product_db/_doc/12
355  {
356      "id": "37",
357      "name": "(华为)HUAWEI MateBook X Pro 2019款 13.9英寸3K触控全面屏 轻薄笔记本",
358      "keywords": "轻薄笔记本华为 笔记本电脑",
359      "subTitle": "轻薄华为笔记本 电脑",
360      "price": "4769",
361      "promotionPrice": "4469",
362      "originalPrice": "4999",
363      "pic": "http://tuling-mall.oss-cn-
      shenzhen.aliyuncs.com/tulingmall/images/20200317/800_800_1555752016264mp.png",
364      "sale": 999,
365      "hasStock": true,
```

```
    "salecount":699,
    "putawayDate":"2021-04-14",
    "brandId": 3,
    "brandName": "华为",
    "brandImg": "http://macro-oss.oss-cn-
shenzhen.aliyuncs.com/mall/images/20190129/17f2dd9756d9d333bee8e60ce8c03e4c_222_222.jpg
",
    "categoryId": 19,
    "categoryName": "手机通讯",
    "attrs": [
      {
        "attrId": 9,
        "attrName": "容量",
        "attrValue": "16G"
      },
      {
        "attrId": 10,
        "attrName": "网络",
        "attrValue": "4G"
      }
    ]
}
PUT /product_db/_doc/13
{
    "id": "38",
    "name": "华为nova6se 手机 绮境森林 全网通（8G+128G)",
    "keywords": "轻薄笔记本华为 手机",
    "subTitle": "华为nova6se 手机",
    "price": "6769",
    "promotionPrice": "6469",
    "originalPrice": "6999",
    "pic": "http://macro-oss.oss-cn-
shenzhen.aliyuncs.com/mall/images/20180607/5ac1bf58Ndefaac16.jpg",
    "sale": 999,
    "hasStock": true,
    "salecount":899,
    "putawayDate":"2021-04-15",
    "brandId": 3,
    "brandName": "华为",
    "brandImg": "http://macro-oss.oss-cn-
shenzhen.aliyuncs.com/mall/images/20190129/17f2dd9756d9d333bee8e60ce8c03e4c_222_222.jpg
```

```
      ",
403       "categoryId": 19,
404       "categoryName": "手机通讯",
405       "attrs": [
406          {
407             "attrId": 9,
408             "attrName": "容量",
409             "attrValue": "64G"
410          },
411          {
412             "attrId": 10,
413             "attrName": "网络",
414             "attrValue": "5G"
415          }
416       ]
417    }
418 PUT /product_db/_doc/14
419 {
420    "id": "39",
421    "name": "iPhone7/6s/8钢化膜苹果8Plus全屏复盖抗蓝光防窥防偷看手机膜",
422    "keywords": "手机膜",
423    "subTitle": "iPhone7/6s/8钢化膜苹果8Plus全屏复盖抗蓝光防窥防偷看手机膜",
424    "price": "29",
425    "promotionPrice": "39",
426    "originalPrice": "49",
427    "pic": "http://tuling-mall.oss-cn-
    shenzhen.aliyuncs.com/tulingmall/images/20200311/6df99dab78bb2014.jpg",
428    "sale": 999,
429    "hasStock": true,
430    "salecount":799,
431    "putawayDate":"2021-04-16",
432    "brandId": 51,
433    "brandName": "苹果",
434    "brandImg": "http://tuling-mall.oss-cn-
    shenzhen.aliyuncs.com/tulingmall/images/20200311/2b84746650fc122d67749a876c453619.png",
435    "categoryId": 30,
436    "categoryName": "手机配件",
437    "attrs": [
438       {
439          "attrId": 11,
```

```json
        "attrName": "手机膜-材料",
        "attrValue": "钢化"
      },
      {
        "attrId": 12,
        "attrName": "手机膜-颜色",
        "attrValue": "白色"
      }
    ]
}

PUT /product_db/_doc/15
{
    "id": "40",
    "name": "七匹狼短袖T恤男纯棉舒适春夏修身运动休闲短袖三条装  圆领3条装",
    "keywords": "七匹狼服装  衣服",
    "subTitle": "七匹狼短袖T恤男纯棉舒适春夏修身运动休闲短袖三条装  圆领3条装",
    "price": "129",
    "promotionPrice": "139",
    "originalPrice": "149",
    "pic": "http://tuling-mall.oss-cn-
    shenzhen.aliyuncs.com/tulingmall/images/20200311/19e846e727dff337.jpg",
    "sale": 999,
    "hasStock": true,
    "salecount":199,
    "putawayDate":"2021-04-20",
    "brandId": 49,
    "brandName": "七匹狼",
    "brandImg": "http://macro-oss.oss-cn-
    shenzhen.aliyuncs.com/mall/images/20190129/18d8bc3eb13533fab466d702a0d3fd1f40345bcd.jpg
    ",
    "categoryId": 8,
    "categoryName": "T恤",
    "attrs": [
      {
        "attrId": 3,
        "attrName": "尺寸",
        "attrValue": "M"
      },
      {
```

```
477        "attrId": 4,
478        "attrName": "颜色",
479        "attrValue": "白色"
480      }
481    ]
482  }
483  PUT /product_db/_doc/16
484  {
485    "id": "41",
486    "name": "华为P40 Pro手机",
487    "keywords": "华为手机",
488    "subTitle": "华为P40 Pro手机",
489    "price": "2129",
490    "promotionPrice": "2139",
491    "originalPrice": "2149",
492    "pic": "http://macro-oss.oss-cn-
       shenzhen.aliyuncs.com/mall/images/20180607/5ac1bf58Ndefaac16.jpg",
493    "sale": 999,
494    "hasStock": true,
495    "salecount":199,
496    "putawayDate":"2021-05-03",
497    "brandId": 3,
498    "brandName": "华为",
499    "brandImg": "http://macro-oss.oss-cn-
       shenzhen.aliyuncs.com/mall/images/20190129/17f2dd9756d9d333bee8e60ce8c03e4c_222_222.jpg
       ",
500    "categoryId": 19,
501    "categoryName": "手机通讯",
502    "attrs": [
503      {
504        "attrId": 9,
505        "attrName": "容量",
506        "attrValue": "128G"
507      },
508      {
509        "attrId": 10,
510        "attrName": "网络",
511        "attrValue": "5G"
512      }
513    ]
```

```
514  }
515  PUT /product_db/_doc/17
516  {
517    "id": "42",
518    "name": "朵唯智能手机  4G全网通  老人学生双卡双待手机",
519    "keywords": "朵唯手机",
520    "subTitle": "朵唯手机后置双摄，国产虎贲芯片！优化散热结构！浅薄机身！朵唯4月特惠！",
521    "price": "3129",
522    "promotionPrice": "3139",
523    "originalPrice": "3249",
524    "pic": "http://macro-oss.oss-cn-
     shenzhen.aliyuncs.com/mall/images/20180615/xiaomi.jpg",
525    "sale": 999,
526    "hasStock": true,
527    "salecount":1199,
528    "putawayDate":"2021-06-01",
529    "brandId": 59,
530    "brandName": "朵唯",
531    "brandImg": "http://tuling-mall.oss-cn-
     shenzhen.aliyuncs.com/tulingmall/images/20200311/2b84746650fc122d67749a876c453619.png",
532    "categoryId": 19,
533    "categoryName": "手机通讯",
534    "attrs": [
535      {
536        "attrId": 9,
537        "attrName": "容量",
538        "attrValue": "32G"
539      },
540      {
541        "attrId": 10,
542        "attrName": "网络",
543        "attrValue": "4G"
544      }
545    ]
546  }
547
```

1.4 构建DSL语句实现商品搜索

ES高级查询语法Query DSL实战 ElasticSearch搜索技术深入与聚合查询实战

```
1   POST /product_db/_doc/_search
2   {
3     "from": 0,
4     "size": 8,
5     "query": {
6       "bool": {
7         "must": [
8           {
9             "match": {
10              "name": {
11                "query": "手机"
12              }
13            }
14          }
15        ],
16        "filter": [
17          {
18            "term": {
19              "hasStock": {
20                "value": true
21              }
22            }
23          },
24          {
25            "range": {
26              "price": {
27                "from": "1",
28                "to": "5000"
29              }
30            }
31          }
32        ]
33      }
34    },"sort": [
```

```
35        {
36          "salecount": {
37            "order": "asc"
38          }
39        }
40      ],
41      "aggregations": {
42        "brand_agg": {
43          "terms": {
44            "field": "brandId",
45            "size": 50
46          },
47          "aggregations": {
48            "brand_name_agg": {
49              "terms": {
50                "field": "brandName"
51              }
52            },
53            "brand_img_agg": {
54              "terms": {
55                "field": "brandImg"
56              }
57            }
58          }
59        },
60        "category_agg": {
61          "terms": {
62            "field": "categoryId",
63            "size": 50,
64            "min_doc_count": 1
65          },
66          "aggregations": {
67            "category_name_agg": {
68              "terms": {
69                "field": "categoryName"
70              }
71            }
72          }
73        },
74        "attr_agg": {
```

```
75          "nested": {
76            "path": "attrs"
77          },
78          "aggregations": {
79            "attr_id_agg": {
80              "terms": {
81                "field": "attrs.attrId"
82              },
83              "aggregations": {
84                "attr_name_agg": {
85                  "terms": {
86                    "field": "attrs.attrName"
87                  }
88                },
89                "attr_value_agg": {
90                  "terms": {
91                    "field": "attrs.attrValue"
92                  }
93                }
94              }
95            }
96          }
97        }
98      },
99      "highlight": {
100       "pre_tags": [
101         "<b style='color:red'>"
102       ],
103       "post_tags": [
104         "</b>"
105       ],
106       "fields": {
107         "name": {}
108       }
109     }
110   }
111
112
```

```
1   GET product_db/_search
2   {
3     "from": 0,
4     "size": 20,
5     "query": {
6       "bool": {
7         "must": [
8           {
9             "multi_match": {
10              "query": "手机",
11              "fields": [
12                "name",
13                "keywords",
14                "subTitle"
15              ]
16            }
17          }
18        ],
19        "filter": [
20          {
21            "term": {
22              "hasStock": "true"
23            }
24          },
25          {
26            "range": {
27              "price": {
28                "gte": 2000,
29                "lte": 5000
30              }
31            }
32          }
33        ]
34      }
35    },
36    "aggs": {
```

```json
      "brandId_aggs": {
        "terms": {
          "field": "brandId",
          "size": 10
        },
        "aggs": {
          "brandName_aggs": {
            "terms": {
              "field": "brandName"
            }
          },
          "brandImg_aggs": {
            "terms": {
              "field": "brandImg"
            }
          }
        }
      },
      "categoryId_aggs": {
        "terms": {
          "field": "categoryId",
          "size": 10
        },
        "aggs": {
          "categoryName_aggs": {
            "terms": {
              "field": "categoryName"
            }
          }
        }
      },
      "attrs_aggs": {
        "nested": {
          "path": "attrs"
        },
        "aggs": {
          "attrId_aggs": {
            "terms": {
              "field": "attrs.attrId"
            },
```

```
77            "aggs": {
78              "attrName_aggs": {
79                "terms": {
80                  "field": "attrs.attrName"
81                }
82              },
83              "attrValue_aggs": {
84                "terms": {
85                  "field": "attrs.attrValue"
86                }
87              }
88            }
89          }
90        }
91      }
92    },
93    "sort": [
94      {
95        "salecount": {
96          "order": "desc"
97        }
98      }
99    ],
100   "highlight": {
101     "fields": {
102       "*": {}
103     }
104   }
105 }
```

1.5 Java代码实现商品搜索功能

1）引入依赖

```
1 <dependency>
2   <groupId>org.springframework.boot</groupId>
```

```
3        <artifactId>spring-boot-starter-data-elasticsearch</artifactId>
4    </dependency>
```

2) 核心代码

```java
1  @Qualifier("restHighLevelClient")
2  @Autowired
3  private RestHighLevelClient client;
4
5
6  @Override
7  public ESResponseResult search(ESRequestParam param) {
8
9      try {
10         //1、构建检索对象-封装请求相关参数信息
11         SearchRequest searchRequest = startBuildRequestParam(param);
12
13         //2、进行检索操作
14         SearchResponse response = client.search(searchRequest, RequestOptions.DEFAULT);
15
16         //3、分析响应数据，封装成指定的格式
17         ESResponseResult responseResult = startBuildResponseResult(response, param);
18         return responseResult;
19     } catch (Exception e) {
20         e.printStackTrace();
21     }
22
23     return null;
24
25 }
26
27 /**
28  * 封装请求参数信息
29  * 关键字查询、根据属性、分类、品牌、价格区间、是否有库存等进行过滤、分页、高亮、以及聚合统计品
牌分类属性
30  *
31  */
32 private SearchRequest startBuildRequestParam(ESRequestParam param) {
```

```java
33
34      SearchSourceBuilder searchSourceBuilder = new SearchSourceBuilder();
35
36      /**
37       * 关键字查询、根据属性、分类、品牌、价格区间、是否有库存等进行过滤、分页、高亮、以及聚合统
   计品牌分类属性
38       */
39      BoolQueryBuilder boolQueryBuilder = new BoolQueryBuilder();
40
41      //1、
42      if (!StringUtils.isEmpty(param.getKeyword())) {
43          //单字段查询
44          //boolQueryBuilder.must(QueryBuilders.matchQuery("name", param.getKeyword()));
45          //多字段查询
46
   boolQueryBuilder.must(QueryBuilders.multiMatchQuery(param.getKeyword(),"name","keywords
   ","subTitle"));
47      }
48
49      //2、根据类目ID进行过滤
50      if (null != param.getCategoryId()) {
51          boolQueryBuilder.filter(QueryBuilders.termQuery("categoryId",
   param.getCategoryId()));
52      }
53
54      //3、根据品牌ID进行过滤
55      if (null != param.getBrandId() && param.getBrandId().size() > 0) {
56          boolQueryBuilder.filter(QueryBuilders.termsQuery("brandId",
   param.getBrandId()));
57      }
58
59      //4、根据属性进行相关过滤
60      if (param.getAttrs() != null && param.getAttrs().size() > 0) {
61
62          param.getAttrs().forEach(item -> {
63              //attrs=1_白色&2_4核
64              BoolQueryBuilder boolQuery = QueryBuilders.boolQuery();
65
66              //attrs=1_64G
67              String[] s = item.split("_");
68              String attrId = s[0];
```

```java
                String[] attrValues = s[1].split(":");//这个属性检索用的值
                boolQuery.must(QueryBuilders.termQuery("attrs.attrId", attrId));
                boolQuery.must(QueryBuilders.termsQuery("attrs.attrValue", attrValues));

                NestedQueryBuilder nestedQueryBuilder = QueryBuilders.nestedQuery("attrs",
boolQuery, ScoreMode.None);
                boolQueryBuilder.filter(nestedQueryBuilder);
            });

    }

    //5、是否有库存
    if (null != param.getHasStock()) {
        boolQueryBuilder.filter(QueryBuilders.termQuery("hasStock", param.getHasStock()
== 1));
    }

    /* if (price.length == 2) {
        //price: _5000
        if (param.getPrice().startsWith("_")) {
            rangeQueryBuilder.lte(price[1]);
        }
    else{
            //price: 1_5000
            rangeQueryBuilder.gte(price[0]).lte(price[1]);
    }

} else if (price.length == 1) {
     //price: 1_
    if (param.getPrice().endsWith("_")) {
        rangeQueryBuilder.gte(price[0]);
    }
}*/

    //6、根据价格过滤
    if (!StringUtils.isEmpty(param.getPrice())) {
        //价格的输入形式为：10-100（起始价格和最终价格）或-100（不指定起始价格）或10-（不限制
最终价格）
        RangeQueryBuilder rangeQueryBuilder = QueryBuilders.rangeQuery("price");
        String[] price = param.getPrice().split("_");
```

```java
            if (price.length == 2) {
                rangeQueryBuilder.gte(price[0]).lte(price[1]);
            } else if (price.length == 1) {
                if (param.getPrice().startsWith("_")) {
                    rangeQueryBuilder.lte(price[1]);
                }
                if (param.getPrice().endsWith("_")) {
                    rangeQueryBuilder.gte(price[0]);
                }
            }
        boolQueryBuilder.filter(rangeQueryBuilder);
    }

    //封装所有查询条件
    searchSourceBuilder.query(boolQueryBuilder);


    /**
     * 实现排序、高亮、分页操作
     */

    //排序
    //页面传入的参数值形式 sort=price_asc/desc
    if (!StringUtils.isEmpty(param.getSort())) {
        String sort = param.getSort();
        String[] sortFileds = sort.split("_");
        System.out.println("sortFileds:"+sortFileds.length);
        if(!StringUtils.isEmpty(sortFileds[0])){
            SortOrder sortOrder = "asc".equalsIgnoreCase(sortFileds[1]) ? SortOrder.ASC
: SortOrder.DESC;
            searchSourceBuilder.sort(sortFileds[0], sortOrder);
        }
    }

    //分页查询
    searchSourceBuilder.from((param.getPageNum() - 1) * SearchConstant.PAGE_SIZE);
    searchSourceBuilder.size(SearchConstant.PAGE_SIZE);

    //高亮显示
    if (!StringUtils.isEmpty(param.getKeyword())) {
```

```java
145
146        HighlightBuilder highlightBuilder = new HighlightBuilder();
147        highlightBuilder.field("name");
148        highlightBuilder.preTags("<b style='color:red'>");
149        highlightBuilder.postTags("</b>");
150
151        searchSourceBuilder.highlighter(highlightBuilder);
152    }
153
154
155    /**
156     * 对品牌、分类信息、属性信息进行聚合分析
157     */
158    //1. 按照品牌进行聚合
159    TermsAggregationBuilder brand_agg = AggregationBuilders.terms("brand_agg");
160    brand_agg.field("brandId").size(50);
161
162
163    //1.1 品牌的子聚合-品牌名聚合
164    brand_agg.subAggregation(AggregationBuilders.terms("brand_name_agg")
165            .field("brandName").size(1));
166    //1.2 品牌的子聚合-品牌图片聚合
167    brand_agg.subAggregation(AggregationBuilders.terms("brand_img_agg")
168            .field("brandImg").size(1));
169
170    searchSourceBuilder.aggregation(brand_agg);
171
172    //2. 按照分类信息进行聚合
173    TermsAggregationBuilder category_agg = AggregationBuilders.terms("category_agg");
174    category_agg.field("categoryId").size(50);
175
176
category_agg.subAggregation(AggregationBuilders.terms("category_name_agg").field("categ
oryName").size(1));
177
178    searchSourceBuilder.aggregation(category_agg);
179
180    //2. 按照属性信息进行聚合
181    NestedAggregationBuilder attr_agg = AggregationBuilders.nested("attr_agg",
"attrs");
```

```java
182        //2.1 按照属性ID进行聚合

183        TermsAggregationBuilder attr_id_agg =
    AggregationBuilders.terms("attr_id_agg").field("attrs.attrId");

184        attr_agg.subAggregation(attr_id_agg);

185        //2.1.1 在每个属性ID下，按照属性名进行聚合

186
    attr_id_agg.subAggregation(AggregationBuilders.terms("attr_name_agg").field("attrs.attr
    Name").size(1));

187        //2.1.1 在每个属性ID下，按照属性值进行聚合

188
    attr_id_agg.subAggregation(AggregationBuilders.terms("attr_value_agg").field("attrs.att
    rValue").size(50));

189        searchSourceBuilder.aggregation(attr_agg);

190

191        System.out.println("构建的DSL语句 {}:"+ searchSourceBuilder.toString());

192

193        SearchRequest searchRequest = new SearchRequest(new String[]
    {SearchConstant.INDEX_NAME}, searchSourceBuilder);

194

195        return searchRequest;

196    }

197

198

199    /**

200     * 封装查询到的结果信息

201     * 关键字查询、根据属性、分类、品牌、价格区间、是否有库存等进行过滤、分页、高亮、以及聚合统计品
    牌分类属性

202     */

203    private ESResponseResult startBuildResponseResult(SearchResponse response,
    ESRequestParam param) {

204

205        ESResponseResult result = new ESResponseResult();

206

207        //1、获取查询到的商品信息

208        SearchHits hits = response.getHits();

209

210        List<EsProduct> esModels = new ArrayList<>();

211        //2、遍历所有商品信息

212        if (hits.getHits() != null && hits.getHits().length > 0) {

213            for (SearchHit hit : hits.getHits()) {

214                String sourceAsString = hit.getSourceAsString();

215                EsProduct esModel = JSON.parseObject(sourceAsString, EsProduct.class);
```

```java
216
217                    //2.1 判断是否按关键字检索，若是就显示高亮，否则不显示
218            if (!StringUtils.isEmpty(param.getKeyword())) {
219                    //2.2 拿到高亮信息显示标题
220                    HighlightField name = hit.getHighlightFields().get("name");
221                    //2.3 判断name中是否含有查询的关键字(因为是多字段查询，因此可能不包含指定的关
       键字，假设不包含则显示原始name字段的信息)
222                    String nameValue = name!=null ? name.getFragments()[0].string() :
       esModel.getName();
223                    esModel.setName(nameValue);
224            }
225            esModels.add(esModel);
226        }
227    }
228    result.setProducts(esModels);
229
230    //3、当前商品涉及到的所有品牌信息，小米手机和小米电脑都属于小米品牌，过滤重复品牌信息
231    Set<ESResponseResult.BrandVo> brandVos = new LinkedHashSet<>();
232    //获取到品牌的聚合
233    ParsedLongTerms brandAgg = response.getAggregations().get("brand_agg");
234    for (Terms.Bucket bucket : brandAgg.getBuckets()) {
235        ESResponseResult.BrandVo brandVo = new ESResponseResult.BrandVo();
236
237        //获取品牌的id
238        long brandId = bucket.getKeyAsNumber().longValue();
239        brandVo.setBrandId(brandId);
240
241        //获取品牌的名字
242        ParsedStringTerms brandNameAgg =
       bucket.getAggregations().get("brand_name_agg");
243        String brandName = brandNameAgg.getBuckets().get(0).getKeyAsString();
244        brandVo.setBrandName(brandName);
245
246        //获取品牌的LOGO
247        ParsedStringTerms brandImgAgg = bucket.getAggregations().get("brand_img_agg");
248        String brandImg = brandImgAgg.getBuckets().get(0).getKeyAsString();
249        brandVo.setBrandImg(brandImg);
250        System.out.println("brandId:"+brandId+"brandName:"+brandName+"brandImg");
251        brandVos.add(brandVo);
252    }
```

```java
253        System.out.println("brandVos.size:"+brandVos.size());
254        result.setBrands(brandVos);
255
256
257        //4、当前商品相关的所有类目信息
258        //获取到分类的聚合
259        List<ESResponseResult.categoryVo> categoryVos = new ArrayList<>();
260
261        ParsedLongTerms categoryAgg = response.getAggregations().get("category_agg");
262
263
264        for (Terms.Bucket bucket : categoryAgg.getBuckets()) {
265            ESResponseResult.categoryVo categoryVo = new ESResponseResult.categoryVo();
266            //获取分类id
267            String keyAsString = bucket.getKeyAsString();
268            categoryVo.setCategoryId(Long.parseLong(keyAsString));
269
270            //获取分类名
271            ParsedStringTerms categoryNameAgg =
    bucket.getAggregations().get("category_name_agg");
272            String categoryName = categoryNameAgg.getBuckets().get(0).getKeyAsString();
273            categoryVo.setCategoryName(categoryName);
274            categoryVos.add(categoryVo);
275        }
276
277        result.setCategorys(categoryVos);
278
279
280
281        //5、获取商品相关的所有属性信息
282        List<ESResponseResult.AttrVo> attrVos = new ArrayList<>();
283        //获取属性信息的聚合
284        ParsedNested attrsAgg = response.getAggregations().get("attr_agg");
285        ParsedLongTerms attrIdAgg = attrsAgg.getAggregations().get("attr_id_agg");
286        for (Terms.Bucket bucket : attrIdAgg.getBuckets()) {
287            ESResponseResult.AttrVo attrVo = new ESResponseResult.AttrVo();
288            //获取属性ID值
289            long attrId = bucket.getKeyAsNumber().longValue();
290            attrVo.setAttrId(attrId);
291
```

```java
292            //获取属性的名字
293            ParsedStringTerms attrNameAgg = bucket.getAggregations().get("attr_name_agg");
294            String attrName = attrNameAgg.getBuckets().get(0).getKeyAsString();
295            attrVo.setAttrName(attrName);
296
297            //获取属性的值
298            ParsedStringTerms attrValueAgg =
      bucket.getAggregations().get("attr_value_agg");
299            List<String> attrValues = attrValueAgg.getBuckets().stream().map(item ->
      item.getKeyAsString()).collect(Collectors.toList());
300            attrVo.setAttrValue(attrValues);
301
302            attrVos.add(attrVo);
303        }
304
305        result.setAttrs(attrVos);
306
307        //6、进行分页操作
308        result.setPageNum(param.getPageNum());
309        //获取总记录数
310        long total = hits.getTotalHits().value;
311        result.setTotal(total);
312
313        //计算总页码
314        int totalPages = (int) total % SearchConstant.PAGE_SIZE == 0 ?
315                (int) total / SearchConstant.PAGE_SIZE : ((int) total /
      SearchConstant.PAGE_SIZE + 1);
316        result.setTotalPages(totalPages);
317
318        List<Integer> pageNavs = new ArrayList<>();
319        for (int i = 1; i <= totalPages; i++) {
320            pageNavs.add(i);
321        }
322        result.setPageNavs(pageNavs);
323
324        return result;
325    }
326
```

测试

http://localhost:8054/searchList?price=1_5000&keyword=%E6%89%8B%E6%9C%BA&sort=salecount_asc&hasStock=1&pageNum=1&pageSize=20&categoryId=19&attrs=2_%E8%93%9D%E8%89%B2&attrs=1_2%E6%A0%B8

测试

http://localhost:8054/searchList?price=1_5000&keyword=%E6%89%8B%E6%9C%BA&sort=salecount_asc&hasStock=1&pageNum=1&pageSize=20&categoryId=19&attrs=2_%E8%93%9D%E8%89%B2&attrs=1_2%E6%A0%B8