

实践3 基于Elasticsearch的KBQA系统实现

课程名称: 知识工程 实验日期: 2023/6/22

班级: 人工智能 x 班 姓名: 学号:

一、实践要求

1、基于 Elasticsearch 搭建 KBQA 系统，完成一个问答 demo。

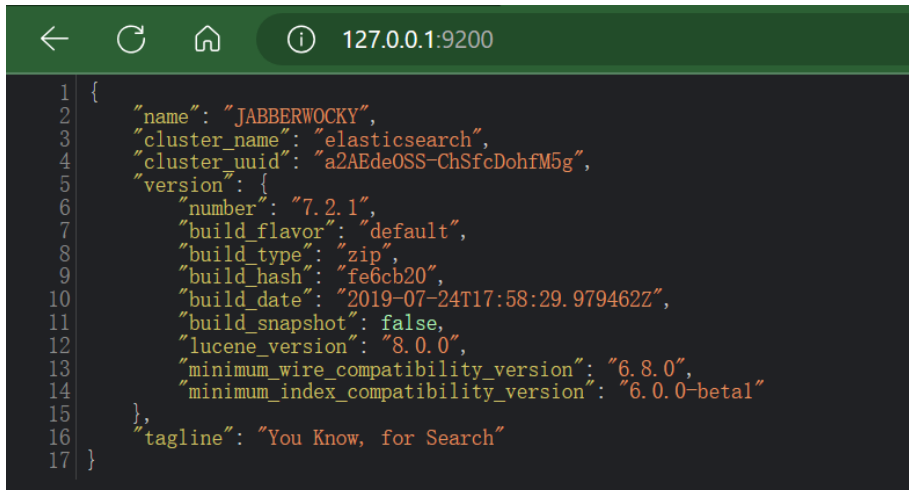
二、实践内容

1、搭建 KBQA 系统

2、解析输入的自然语言查询语句生成 Elasticsearch 查询

三、实践步骤（包括源码与过程截图）

2. 环境准备



```
1 {
2   "name": "JABBERWOCKY",
3   "cluster_name": "elasticsearch",
4   "cluster_uuid": "a2ABdeOSS-ChSfcDohfM5g",
5   "version": {
6     "number": "7.2.1",
7     "build_flavor": "default",
8     "build_type": "zip",
9     "build_hash": "fe6cb20",
10    "build_date": "2019-07-24T17:58:29.979462Z",
11    "build_snapshot": false,
12    "lucene_version": "8.0.0",
13    "minimum_wire_compatibility_version": "6.8.0",
14    "minimum_index_compatibility_version": "6.0.0-beta1"
15  },
16   "tagline": "You Know, for Search"
17 }
```

3. 数据准备

```

code > demo > data > {} Person.json > ...
48 {"po": [{"pred": "birthDate", "obj": "1984\u5e744\u67089\u65e5"}, {"pred": "nati
49 {"po": [{"pred": "birthDate", "obj": "1989\u5e746\u67086\u65e5"}, {"pred": "nati
50 {"po": [{"pred": "birthDate", "obj": "1979\u5e746\u67083\u65e5"}, {"pred": "desc
51 {"po": [{"pred": "birthDate", "obj": "1975\u5e7410\u670830\u65e5"}, {"pred": "na
52 {"po": [{"pred": "birthDate", "obj": "1986\u5e743\u670813\u65e5"}, {"pred": "nat
53 {"po": [{"pred": "birthDate", "obj": "1980\u5e745\u67085\u65e5"}, {"pred": "desc
54 {"po": [{"pred": "birthDate", "obj": "1977\u5e749\u67088\u65e5"}, {"pred": "desc
55 {"po": [{"pred": "birthDate", "obj": "1979\u5e742\u670819\u65e5"}, {"pred": "nat
56 {"po": [{"pred": "nationality", "obj": "\u4fc4\u7f57\u65af"}], "height": 173, "w
57 {"po": [{"pred": "birthDate", "obj": "1983\u5e748\u67089\u65e5"}, {"pred": "desc
58 {"po": [{"pred": "birthDate", "obj": "1991\u5e748\u670826\u65e5"}, {"pred": "nat
59 {"po": [{"pred": "birthDate", "obj": "1992\u5e743\u670824\u65e5"}, {"pred": "des
60 {"po": [{"pred": "birthDate", "obj": "1981\u5e742\u670827\u65e5"}, {"pred": "nat
61 {"po": [{"pred": "birthDate", "obj": "1991\u5e745\u67087\u65e5"}, {"pred": "nati
62 {"po": [{"pred": "birthDate", "obj": "1985\u5e7412\u670814\u65e5"}, {"pred": "de
63 {"po": [{"pred": "birthDate", "obj": "1991\u5e741\u670829\u65e5"}, {"pred": "nat

```

4. 导入 elasticsearch

4.2 在 elasticsearch 中新建 index 和 type

```

curl -H "Content-Type: application/json" -XPUT "http://127.0.0.1:9200/demo?pretty"
-d '{"mappings': {'person': {'properties': {'subj': {'type': 'keyword'},
'height': {'type': 'integer'}, 'weight': {'type': 'integer'}, 'po': {'type':
'nested', 'properties': {'pred': {'type': 'keyword'},
'obj': {'type': 'keyword'}}}}}}}'

```

```

D:\1-School\知识工程\知识工程实验及报告模板\实验三\KBQA系统演示手册资料\code>curl -H "Con
PUT "http://127.0.0.1:9200/demo?pretty" -d '{"mappings': {'person': {'properties': {
word'}, 'height': {'type': 'integer'}, 'weight': {'type': 'integer'}, 'po': {'
rties': {'pred': {'type': 'keyword'}, 'obj': {'type': 'keyword'}}}}}}'"
{"error": {"root_cause": [{"type": "resource_already_exists_exception", "reason": "index [demo/NuExV3h3RFOLniwH54c2NQ] already exists", "index_uuid": "NuExV3h3RFOLniwH54c2NQ", "index": "demo"}], "type": "resource_already_exists_exception", "reason": "index [demo/NuExV3h3RFOLniwH54c2NQ] already exists", "index_uuid": "NuExV3h3RFOLniwH54c2NQ", "index": "demo"}, "status": 400}
D:\1-School\知识工程\知识工程实验及报告模板\实验三\KBQA系统演示手册资料\code>

```

显示已经存在

4.3 导入数据 (insert.py)

```
PROBLEMS 2 OUTPUT DEBUG CONSOLE TERMINAL

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PS D:\1-School\知识工程\知识工程实验及报告模板\实验三\KBQA系统演示手册资料> |
```

建立字典：

```
76
77 if __name__ == '__main__':
78     dump_ac_attr_dict(attr_list_file, attr_out_path)
79     dump_ac_entity_dict(entity_list_file, entity_out_path)
80     print(load_ac_dict(attr_out_path))
81     print(load_attr_map(attr_list_file))
82     print(load_entity_dict(entity_list_file))
83     print(load_val_dict(val_list_file))
84

File "d:\1-School\知识工程\知识工程实验及报告模板\实验三\KBQA系统演示手册资料\code\demo\search\build_dict.py", line 80, in <module>
    print(load_ac_dict(attr_out_path))
File "d:\1-School\知识工程\知识工程实验及报告模板\实验三\KBQA系统演示手册资料\code\demo\search\build_dict.py", line 41, in load_ac_dict
    A = cPickle.load(open(out_path, "rb", encoding='utf-8'))
ValueError: binary mode doesn't take an encoding argument
PS D:\1-School\知识工程\知识工程实验及报告模板\实验三\KBQA系统演示手册资料> d:; cd 'd:\1-School\知识工程\知识工程实验及报告模板\实验三\KBQA系统演示手册资料'; & 'D:\anaconda\python.exe' 'c:\Users\zq\.vscode\extensions\ms-python.python-2023.10.1\pythonFiles\lib\python\debugpy\adapter\..\..\debugpy\launcher' '55725' '--' 'd:\1-School\知识工程\知识工程实验及报告模板\实验三\KBQA系统演示手册资料\code\demo\search\build_dict.py'
<ahocorasick.Automaton object at 0x00000248F838E030>
defaultdict(<class 'list'>, {'weight': ['weight'], '重量': ['weight'], '多重': ['weight'], '体重': ['weight'], 'WEIGHT': ['weight'], 'relatedTo': ['relatedTo'], '相关': ['relatedTo'], '有关': ['relatedTo'], 'RELATEDTO': ['relatedTo'], 'telephone': ['telephone'], '电话': ['telephone'], '号码': ['telephone'], '电话号': ['telephone'], '电话号码': ['telephone'], '手机': ['telephone'], '手机号': ['telephone'], '手机号码': ['telephone'], 'TELEPHONE': ['telephone'], 'birthDate': ['birthDate'], '出生日期': ['birthDate'], '出生时间': ['birthDate'], '生日': ['birthDate'], '时候出生': ['birthDate'], '年出生': ['birthDate'], 'BIRTHDATE': ['birthDate'], 'height': ['height'], '高度': ['height'], '海拔': ['height'], '海拔': ['height'], '多高': ['height'], '身高': ['height'], 'HEIGHT': ['height'], 'sibling': ['sibling'], '兄弟': ['sibling'], '哥哥': ['sibling'], '姐姐': ['sibling'], '弟弟': ['sibling'], '妹妹': ['sibling'], '姐妹': ['sibling'], 'SIBLING': ['sibling'], 'workLocation': ['workLocation'], '工作地点': ['workLocation'], '在哪工作': ['workLocation'], '在哪上班': ['workLocation'], '上班地点': ['workLocation'], 'WORKLOCATION': ['workLocation'], 'children': ['children'], '子女': ['children'], '孩子': ['children'], '儿子': ['children'], 'CHILDREN': ['children'], '年龄': ['age'], '几岁': ['age'], '多大': ['age'], '面积': ['area'], '代表作品': ['representativeWorks'], '代表作': ['representativeWorks']})
```

此时已经可以检索该知识库了，例如，按照实体名称检索：

curl -H "Content-Type: application/json" -XGET

"http://127.0.0.1:9200/demo/person/_search?&pretty" -d "{ \"query\": { \"bool\": { \"must\": { \"term\": { \"subj\": \"姚明\" } } } } }

```
C:\Users\zq>curl -H "Content-Type: application/json" -XGET "http://127.0.0.1:9200/demo/person/_search?pretty" -d "{ \"query\": { \"bool\": { \"must\": { \"term\": { \"subj\": \"姚明\" } } } } }"
{
  "took" : 7,
  "timed_out" : false,
  "_shards" : {
    "total" : 1,
    "successful" : 1,
    "skipped" : 0,
    "failed" : 0
  },
  "hits" : {
    "total" : {
      "value" : 0,
      "relation" : "eq"
    },
    "max_score" : null,
    "hits" : [ ]
  }
}
```

四、实践结果

6.4 根据多对(属性名, 属性值)检索实体

```
print(_map_predicate('姚明的身高和体重'))
print(_entity_linking('姚明的身高和体重'))
print(_val_linking("姚明的身高和体重"))
# print(_search_single_subj('姚明'))
```

```
PS D:\1-School\知识工程\知识工程实验及报告模板\实验三\KBQA系统演示手册资料> d:; cd 'd:\
系统演示手册资料'; & 'D:\anaconda\python.exe' 'c:\Users\zq\.vscode\extensions\ms-python.
ter\..\..\debugpy\launcher' '56712' '--' 'd:\1-School\知识工程\知识工程实验及报告模板\实

['height', 'weight']
Building prefix dict from the default dictionary ...
Loading model from cache C:\Users\zq\AppData\Local\Temp\jieba.cache
Loading model cost 0.367 seconds.
Prefix dict has been built successfully.
['姚明']
{'姚明': 'spouse'}
PS D:\1-School\知识工程\知识工程实验及报告模板\实验三\KBQA系统演示手册资料> []
```

四、实践心得

源代码一大堆屁用没有的冗余代码，删了一大堆终于成功了。这款分词系统对于不同的系统来说有不同的处理方式，对新手而言极不友好，还没有现成的教材，能转起来就已经是筋疲力尽了。