血糖数据

> 数据文件的格式依据Abbott 血糖仪，整理处理流程

1. 流程/IO

1.1 流程

1. 从文件读取原始数据
2. 文件编码识别(默认关闭)
3. clean原始数据
4. 生成df/ts
5. 过滤异常值
6. 插值重采样

```
docker下运行时间：约500ms
2018-11-27 21:02:05,053 - Timer: buildManager spent 11.3ms
2018-11-27 21:02:05,061 - Timer: read_raw spent 6.9ms
2018-11-27 21:02:05,064 - Timer: clean_raw spent 10.6ms
2018-11-27 21:02:05,191 - Timer: ts_convert spent 137.4ms
2018-11-27 21:02:05,195 - Timer: check spent 3.7ms
2018-11-27 21:02:05,308 - Timer: breaks spent 112.7ms
2018-11-27 21:02:05,332 - Timer: resample spent 136.6ms
2018-11-27 21:02:05,499 - Timer: get_resample spent 457.1ms
```

1.2 输入数据实例

```
ID  时间  记录类型    葡萄糖历史记录（mmol/L） 扫描的葡萄糖读数（mmol/L）    没有标注数值的速效胰岛素    速效胰岛素（单位）    没有标注数值的食物    碳水化合物（克）    没有标注数值的长效胰岛素    长效胰岛素（单位）    备注  试纸测得的葡萄糖（mmol/L）    酮（mmol/L）    不适用  不适用  不适用  以前的时间    更新后的时间
85  2018/09/10 13:50    0   5.2
86  2018/09/10 14:05    1       5.0
88  2018/09/10 14:05    0   4.9
89  2018/09/10 14:20    0   5.1
90  2018/09/10 14:35    0   5.3
91  2018/09/10 14:50    0   5.2
92  2018/09/10 15:05    0   4.9
93  2018/09/10 15:20    0   4.9
94  2018/09/10 15:35    0   5.0
95  2018/09/10 15:50    1       5.1
97  2018/09/10 15:51    0   5.0
98  2018/09/10 16:06    0   5.0
99  2018/09/10 16:21    5                   1
```

1.3 返回实例: 数据读取并转化为特定格式json输出

```
[
    {
        "timestamp": 1536587400000,
        "value": 5.2
    },
    {
        "timestamp": 1536587700000,
        "value": 5.2
    },
    {
        "timestamp": 1536588000000,
        "value": 5
    },
    {
        "timestamp": 1536588300000,
        "value": 5
    },
    {
        "timestamp": 1536588600000,
        "value": 5
    }
]
```

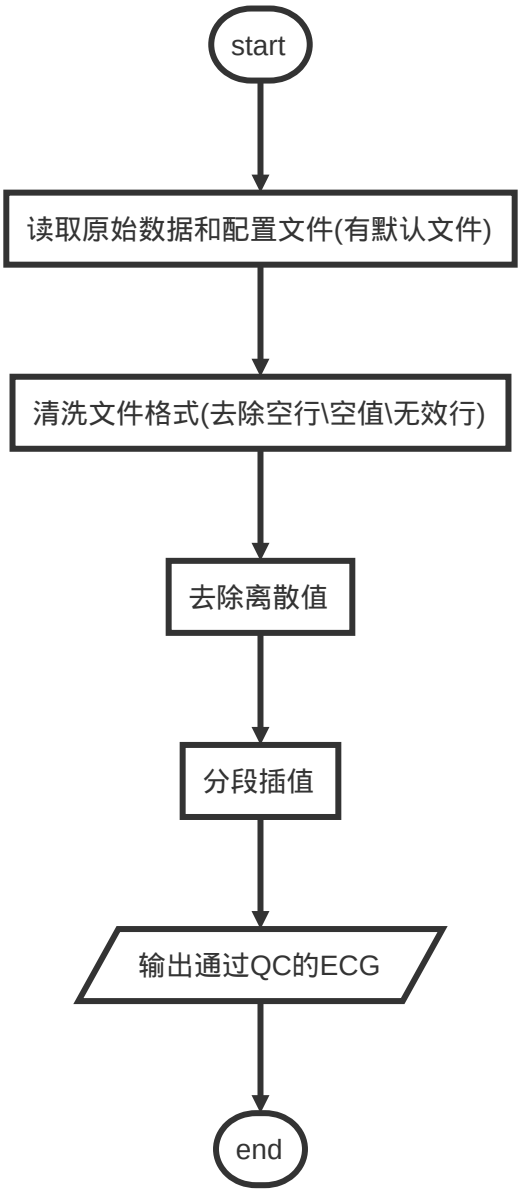
---

2. 质控

2.1 数据质控描述

```
2.1.1 去除空值\无效记录行
2.1.2 去除时间上的离散值(前后60分钟孤立点),去除血糖值上的离散值(保留范围:[均值-3*std,均值+3*std])
2.1.3 为连续时间段的血糖分段插值
```

2.2 数据质控流程图



3 API

3.1 get/resample 获得全流程输出结果--插值后

api: */get/resample*

method: POST

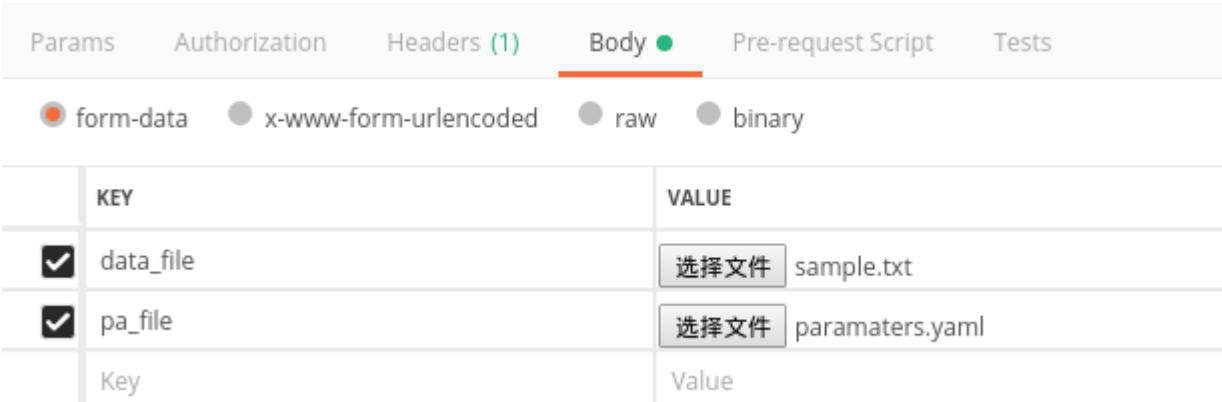
输入：

"device"默认值为"Abbott",

"detect"默认值为"False"

```
{
 "data_path":"sample.txt",
 "device":"Abbott",
 "detect":"False"
}
```

或者上传：(其中pa_file是可选的)



输出：

```
[
    {
        "timestamp": 1536587400000,
        "value": 5.2
    },
    {
        "timestamp": 1536587700000,
        "value": 5.2
    },
    {
        "timestamp": 1536588000000,
        "value": 5
    },
    {
        "timestamp": 1536588300000,
        "value": 5
    },
    {
        "timestamp": 1536588600000,
        "value": 5
    }
]
```

3.2 未插值时间序列: get/ts

api: */get/ts*

method: POST

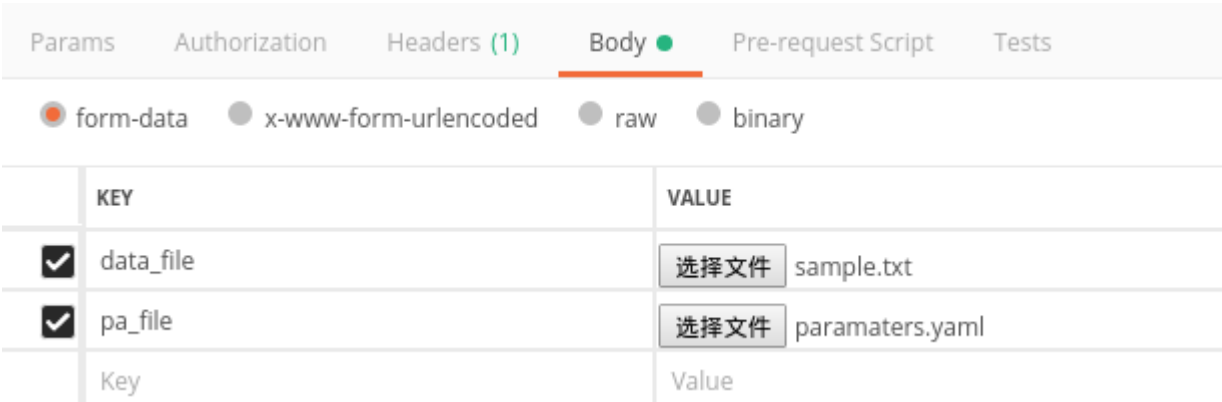
输入：

"device"默认值为"Abbott",

"detect"默认值为"False"

```
{
 "data_path":"sample.txt",
 "device":"Abbott",
 "detect":"False"
}
```

或者上传：(其中pa_file是可选的)



输出：

```
[
    {
        "timestamp": 1536587400000,
        "value": 5.2
    },
    {
        "timestamp": 1536587700000,
        "value": 5.2
    },
    {
        "timestamp": 1536588000000,
        "value": 5
    },
    {
        "timestamp": 1536588300000,
        "value": 5
    },
    {
        "timestamp": 1536588600000,
        "value": 5
    }
]
```

3.3 get/df : 获得数据帧

api: */get/df*

method: POST

输入：

"device"默认值为"Abbott",

"detect"默认值为"False"

```
{
 "data_path":"sample.txt",
 "device":"Abbott",
 "detect":"False"
}
```

或者上传：

输出：

```
[
    {
        "time": "Mon, 10 Sep 2018 13:50:00 GMT",
        "timestamp": 1536587400,
        "value": 5.2
    },
    {
        "time": "Mon, 10 Sep 2018 14:05:00 GMT",
        "timestamp": 1536588300,
        "value": 5
    },
    {
        "time": "Mon, 10 Sep 2018 14:05:00 GMT",
        "timestamp": 1536588300,
        "value": 4.9
    },
    {
        "time": "Mon, 10 Sep 2018 14:20:00 GMT",
        "timestamp": 1536589200,
        "value": 5.1
```

```
    }
]
```

3.4 查看QC参数: get/describe_qc

api: */get/describe_qc*

method: POST

输入：

"device"默认值为"Abbott",

"detect"默认值为"False"

```
{
 "data_path":"sample.txt",
 "device":"Abbott",
 "detect":"False"
}
```

或者上传：同上

输出：

```
{
    "data": {
        "主要参数": {
            "采样率": "300s"
        },
        "设备": "Abbott"
    },
    "message": "success",
    "status_code": 200
}
```

3.5 查看血糖数据信息: get/describe_glucose

api: */get/describe_glucose*

method: POST

输入：

"device"默认值为"Abbott",

"detect"默认值为"False"

```
{
 "data_path":"sample.txt",
 "device":"Abbott",
 "detect":"False"
}
```

或者上传：同上

输出：


```
{
    "data": {
        "原始数据维度": [
            3211,
            19
        ],
        "数据源文件地址": "<FileStorage: 'sample.txt' ('text/plain')>",
        "设备": "Abbott",
        "读出的数据帧的列名": "time,timestamp,value",
        "读出的数据帧的维度": [
            3194,
            3
        ],
        "读出的时间序列起止时间": [
            "Mon, 10 Sep 2018 13:50:00 GMT",
            "Mon, 08 Oct 2018 18:59:00 GMT"
        ],
        "读出的时间序列长度": 3160,
        "连续时间列表": [
            [
                "2018-09-10 13:50:00",
                "2018-09-11 19:27:00"
            ],
            [
                "2018-09-11 20:28:00",
                "2018-09-12 20:33:00"
            ],
            [
                "2018-09-12 22:19:00",
                "2018-09-13 11:37:00"
            ],
            [
                "2018-09-13 12:52:00",
                "2018-09-24 12:27:00"
            ],
            [
                "2018-09-24 20:06:00",
                "2018-10-05 23:21:00"
            ],
            [
                "2018-10-06 00:40:00",
                "2018-10-08 18:59:00"
            ]
        ],
        "连续时间段数": 6
    },
    "message": "success",
    "status_code": 200
}
```

4. 错误处理

4.1 错误码

code	message	describe	HTTP code
200	success	成功	200
1001	Data file is not specified	数据文件未指定	400
1002	Data file path not found	数据文件不存在	400
1003	Parameter file path not found	参数文件不存在	400
1004	Data and Parameter file path must be string	参数类型错误	400
1005	Upload Data error	上传的文件不正确	400
1101	Reading data file failed	读取数据文件失败	500
1102	columns can't be matched	数据文件列名不匹配	500
1103	prase time string failed	有不能解析的时间字符串	500
1006	Can't detect encoding of text	不能识别文件的编码	400

4.2 错误输出示例：

> 包含：
>
> json数据: {"message": "Data file is not specified", "status_code": 1001, "data": null}
>
> 状态码(标准)和修改的状态信息: 400 Data file is not specified

curl

```
```
*   Trying 127.0.0.1...
* TCP_NODELAY set
* Connected to 127.0.0.1 (127.0.0.1) port 7777 (#0)
> POST /get/ts_resample HTTP/1.1
> Host: 127.0.0.1:7777
> User-Agent: curl/7.58.0
> Accept: */*
> Content-Type: application/json
> Content-Length: 2
>
* upload completely sent off: 2 out of 2 bytes
* HTTP 1.0, assume close after body
< HTTP/1.0 400 Data file is not specified
< Content-Type: application/json
< Content-Length: 40
< Server: Werkzeug/0.14.1 Python/3.6.4
< Date: Tue, 27 Nov 2018 08:47:33 GMT
```
```

```
<
* Closing connection 0
{
    "message": "Data file is not specified",
    "status_code": 1001,
    "data": null
}
```

python:

input:

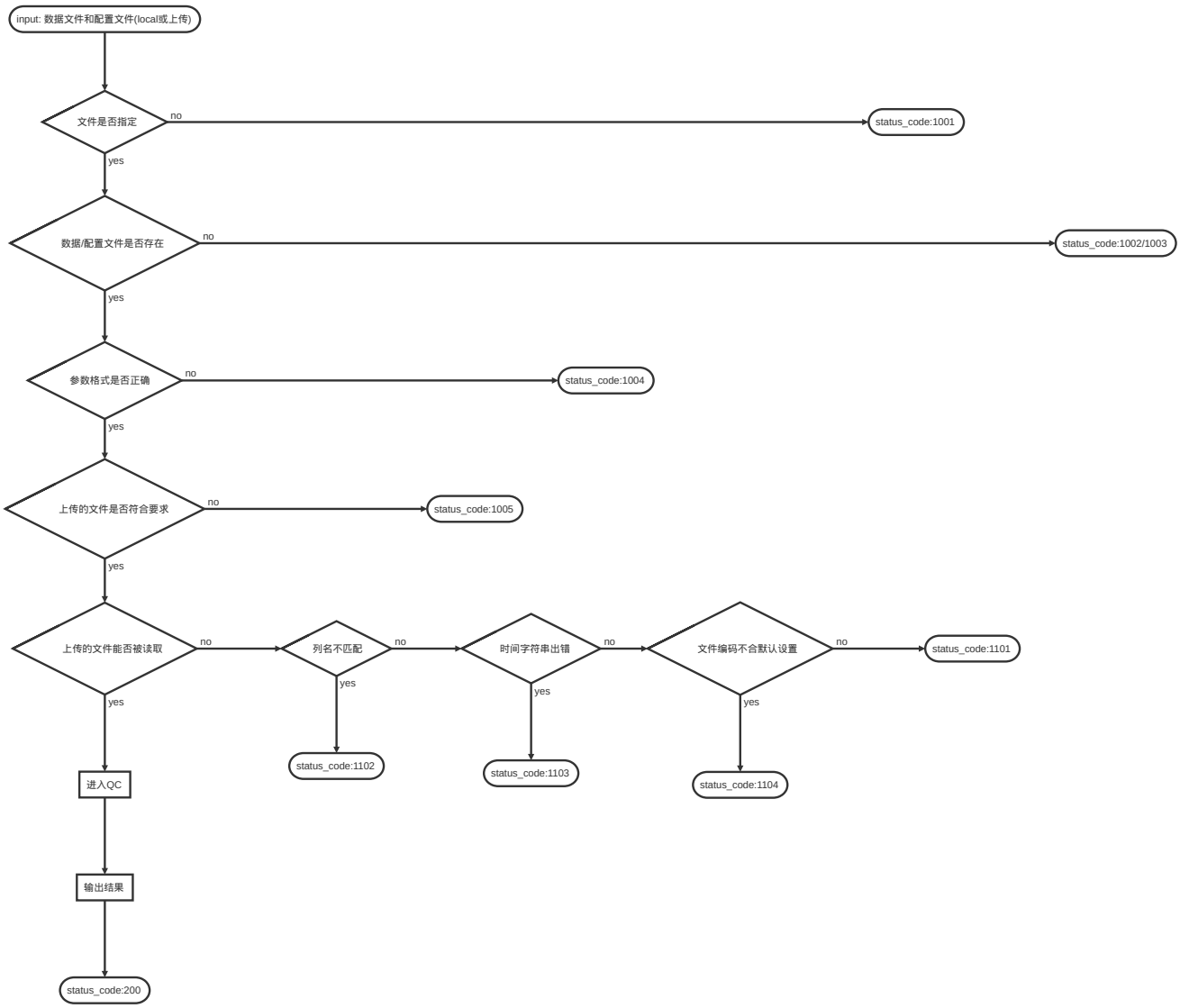
```python
import requests

url = "http://127.0.0.1:7777/get/ts_resample"
data = {}
res = requests.post(url,json=data)
print(res.status_code)
print(res.content)
```

output:

```
400
b'{"message": "Data file is not specified", "status_code": 1001, "data": null}'
```

4.3 排错流程


input: 数据文件和配置文件(local或上传)
文件是否指定
no
status_code:1001
yes
数据/配置文件是否存在
no
status_code:1002/1003
yes
参数格式是否正确
no
status_code:1004
yes
上传的文件是否符合要求
no
status_code:1005
yes
上传的文件能否被读取
no
列名不匹配
no
时间字符串出错
no
文件编码不含默认设置
no
status_code:1101
yes
status_code:1102
yes
status_code:1103
yes
status_code:1104
yes
进入QC
输出结果
status_code:200