



# **Python Data Audit Library API**

*Release 1.00*

**Wenqiang Feng and Ming Chen**

**April 28, 2019**



# CONTENTS

<b>1</b>	<b>Preface</b>	<b>3</b>
1.1	About . . . . .	3
1.1.1	About this API . . . . .	3
1.1.2	About the author . . . . .	3
1.2	Feedback and suggestions . . . . .	4
<b>2</b>	<b>How to Install</b>	<b>5</b>
2.1	Clone the Repository . . . . .	5
2.2	Install . . . . .	5
2.3	Uninstall . . . . .	5
2.4	Test . . . . .	5
<b>3</b>	<b>Python Data Audit Functions</b>	<b>7</b>
3.1	<code>dtypes_class</code> . . . . .	7
3.2	<code>missing_rate</code> . . . . .	7
3.3	<code>zero_rate</code> . . . . .	7
3.4	<code>feature_variance</code> . . . . .	8
<b>4</b>	<b>Demos</b>	<b>9</b>
<b>5</b>	<b>Main Reference</b>	<b>11</b>
	<b>Bibliography</b>	<b>13</b>
	<b>Python Module Index</b>	<b>15</b>
	<b>Index</b>	<b>17</b>





Welcome to our **Python Data Audit Library API**! The PDF version can be downloaded from [HERE](#).



## PREFACE

---

### Chinese proverb

Good tools are prerequisite to the successful execution of a job. – old Chinese proverb

---

## 1.1 About

### 1.1.1 About this API

This document is the API for Our Python Data Audit Library [PyAudit] API. The PDF version can be downloaded from [HERE](#). **You may download and distribute it. Please be aware, however, that the note contains typos as well as inaccurate or incorrect description.**

The API assumes that the reader has a preliminary knowledge of `python` programing and `Linux`. And this document is generated automatically by using `sphinx`.

### 1.1.2 About the author

- **Wenqiang Feng**
  - Sr. Data Scientist and PhD in Mathematics
  - University of Tennessee at Knoxville
  - Webpage: <http://web.utk.edu/~wfeng1/>
  - Email: [von198@gmail.com](mailto:von198@gmail.com)
- **Ming Chen**
  - Data Scientist and PhD in Genome Science and Technology
  - University of Tennessee at Knoxville

– Email: [ming.chen0919@gmail.com](mailto:ming.chen0919@gmail.com)

- **Biography**

Wenqiang Feng is Data Scientist within DST’s Applied Analytics Group. Dr. Feng’s responsibilities include providing DST clients with access to cutting-edge skills and technologies, including Big Data analytic solutions, advanced analytic and data enhancement techniques and modeling.

Dr. Feng has deep analytic expertise in data mining, analytic systems, machine learning algorithms, business intelligence, and applying Big Data tools to strategically solve industry problems in a cross-functional business. Before joining DST, Dr. Feng was an IMA Data Science Fellow at The Institute for Mathematics and its Applications (IMA) at the University of Minnesota. While there, he helped startup companies make marketing decisions based on deep predictive analytics.

Dr. Feng graduated from University of Tennessee, Knoxville, with Ph.D. in Computational Mathematics and Master’s degree in Statistics. He also holds Master’s degree in Computational Mathematics from Missouri University of Science and Technology (MST) and Master’s degree in Applied Mathematics from the University of Science and Technology of China (USTC).

- **Declaration**

The work of Wenqiang Feng was supported by the IMA, while working at IMA. However, any opinion, finding, and conclusions or recommendations expressed in this material are those of the author and do not necessarily reflect the views of the IMA, UTK and DST.

## 1.2 Feedback and suggestions

Your comments and suggestions are highly appreciated. I am more than happy to receive corrections, suggestions or feedbacks through email (Wenqiang Feng: [von198@gmail.com](mailto:von198@gmail.com)) for improvements.



## HOW TO INSTALL

### 2.1 Clone the Repository

```
git clone https://github.com/runawayhorse001/PyAudit.git
```

### 2.2 Install

```
cd PyAudit
pip install -r requirements.txt
python setup.py install
```

### 2.3 Uninstall

```
pip uninstall statspy
```

### 2.4 Test

```
cd PyAudit/test
python test1.py
```

test1.py

```
from PyAudit.basics import missing_rate, zero_rate, dtypes_class

import pandas as pd
```

(continues on next page)

(continued from previous page)

```
d = {'A': [1, 0, None, 3],
     'B': [1, 0, 0, 0],
     'C': ['a', None, 'c', 'd']}

# create DataFrame
df = pd.DataFrame(d)
print(missing_rate(df))
print(zero_rate(df))

# read df
df = pd.read_csv('Heart.csv', dtype={'Sex': bool})
print(df.head(5))
(num_fields, cat_fields, bool_fields, data_types, type_class) = dtypes_
    class(df)

print(num_fields)
print(cat_fields)
print(bool_fields)
print(data_types)
print(type_class)
#print(missing_rate(df))
#print(zero_rate(df))
```

Results:

```
[-1.27920153  0.84000173  1.75114469 -0.02731652 -0.56417185 -0.
    61239996
    -1.47376967  1.39551562 -0.8559779   0.60139758]

-----
    ->-----
#         One Sample t-test
# data:  ['y']
# t = 3.872983346207417, df = 3, p-value = 0.030466291662170977
# alternative hypothesis: true mean is not equal to 0.0
# 95.0 percent confidence interval:
# 0.4457397432391206, 4.554260256760879
# mean of x
#         2.5
-----
    ->-----
```

## PYTHON DATA AUDIT FUNCTIONS

### 3.1 `dtypes_class`

`PyAudit.basics.dtypes_class(df_in)`  
numerical, categorical and bool name list in the DataFrame

**Parameters** `df_in` – input pandas DataFrame

**Returns** numerical, categorical and bool name list

**Author** Wenqiang Feng and Ming Chen

**Email** [von198@gmail.com](mailto:von198@gmail.com)

### 3.2 `missing_rate`

`PyAudit.basics.missing_rate(df_in)`  
calculate missing rate for each feature in the DataFrame

**Parameters** `df_in` – input pandas DataFrame

**Returns** missing rate

**Author** Wenqiang Feng and Ming Chen

**Email** [von198@gmail.com](mailto:von198@gmail.com)

### 3.3 `zero_rate`

`PyAudit.basics.zero_rate(df_in)`  
calculate the percentage of 0 value for each feature in the DataFrame

**Parameters** `df_in` – input pandas DataFrame

**Returns** zero rate

**Author** Wenqiang Feng and Ming Chen

**Email** [von198@gmail.com](mailto:von198@gmail.com)

## 3.4 `feature_variance`

`PyAudit.basics.feature_variance(df_in)`  
calculate the variance for each feature

**Parameters** `df_in` – input pandas DataFrame

**Returns** feature variance

**Author** Wenqiang Feng and Ming Chen

**Email** [von198@gmail.com](mailto:von198@gmail.com)

---

## CHAPTER FOUR

---

## DEMOS

This is a usage of `PyAudit.basics.dtypes_class()`:

For example:

```
>>> from PyAudit.basics import missing_rate, zero_rate, dtypes_class
>>> df = pd.read_csv('Heart.csv', dtype={'Sex': bool})
>>> (num_fields, cat_fields, bool_fields, data_types, ty) = dtypes_
    class(df)
['Age', 'RestBP', 'Chol', 'Fbs', 'RestECG', 'MaxHR', 'ExAng', 'Oldpeak', 'Slope', 'Ca']
['ChestPain', 'Thal', 'AHD']
['Sex']
```

	feature	dtypes
0	Age	int64
1	Sex	bool
2	ChestPain	object
3	RestBP	int64
4	Chol	int64
5	Fbs	int64
6	RestECG	int64
7	MaxHR	int64
8	ExAng	int64
9	Oldpeak	float64
10	Slope	int64
11	Ca	float64
12	Thal	object
13	AHD	object

  

	feature	dtypes	class
0	Age	int64	numeric
1	Sex	bool	bool
2	ChestPain	object	category
3	RestBP	int64	numeric
4	Chol	int64	numeric
5	Fbs	int64	numeric

(continues on next page)

(continued from previous page)

6	RestECG	int64	numeric
7	MaxHR	int64	numeric
8	ExAng	int64	numeric
9	Oldpeak	float64	numeric
10	Slope	int64	numeric
11	Ca	float64	numeric
12	Thal	object	category
13	AHD	object	category

```

      . . . .
    , , , , * , , , ,
  . - ' ` ` ; - ' ) ; ; .
 / ' . - . / * ; ;
.' \d \ ; ;
/ o \ \ ;
 \ _ . , , , , * , , , ,
 \ _ , _ . _ , ' \ _ . - ' ) _ _ ) -- . ; , , , , * , , , ,
 ` " " ` ; ; ; \ / - ' ) _ _ _ ) ` \ ' ' ; ; ; ; ;
 ; * ; ; ; - ' ) ` _ _ ) | \ | ; ; ; * ;
 ; ; ; ; | ` --- ` O | | ; ; * ; ;
 * ; * ; \ | O / ; ; ; ; *
 ; ; ; ; / | . ----- \ / ; ; ; ; ;
 ; ; ; * ; / \ | ' . ( ` . ; ; ; * ; ; ;
 ; ; ; ; ' . ; | ) \ | ; ; ; ; ;
 , ; * ; ; ; \ | . / / ` | ' ; ; ; * ;
 ; ; ; ; ; / | / / _ / ' ; ; ;
 ' * w f * / | / _ | ; * ;
 ` " " " " ` ` " " " " ` ; '

```

---

**CHAPTER**

**FIVE**

---

**MAIN REFERENCE**





## BIBLIOGRAPHY

[PyAudit] Wenqiang Feng and Ming Chen. [Python Data Audit Library API](#), 2019.



## PYTHON MODULE INDEX

### p

`PyAudit.basics`, 8



## INDEX

### D

`dtypes_class()` (*in module PyAudit.basics*), 7

### F

`feature_variance()` (*in module PyAudit.basics*), 8

### M

`missing_rate()` (*in module PyAudit.basics*), 7

### P

`PyAudit.basics` (*module*), 7, 8

### Z

`zero_rate()` (*in module PyAudit.basics*), 7