为你的学术科研做更专业的 Presentation

华中师范大学

Banach Spaces

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数学与统计学学院
Central China Normal University

January 26, 2021

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基础理论

定理 1(Tonelli 定理)

设 $f(x,y)$ 是 $\mathbb{R}^n = \mathbb{R}^p \times \mathbb{R}^q$ 上的非负的广义实值 L-可测函数, 则 (A) 对几乎处处的 $x \in \mathbb{R}^p$, $f(x,y)$ 作为 y 的函数是 $\mathbb{R}^q$ 上的非负的 L-可测函数; (B) $F_f(x) = \int_{\mathbb{R}^q} f(x,y)\mathrm{d}y$, 则 F_f 是 $\mathbb{R}^p$ 上的非负的 L-可测函数; (C) $\int_{\mathbb{R}^n} f(x,y)\mathrm{d}x\mathrm{d}y = \int_{\mathbb{R}^p}\left(\int_{\mathbb{R}^q} \mathrm{f}(\mathrm{x},\mathrm{y})\mathrm{d}y\right)\mathrm{d}x.$

引理 I

(1) 若 $f \in \mathscr{F}$, $a \geq 0$, 则 $af \in \mathscr{F}$.
(2) 若 $f, g \in \mathscr{F}$, 则 $f + g \in \mathscr{F}$.
(3) 若 $f, g \in \mathscr{F}$, $f \geq g$, 且 g 可积, 则 $f - g \in \mathscr{F}$.
(4) 若 $f_k \in \mathscr{F}$, $f_k \leq f_{k+1}$ (其中 $k = 1, 2, \cdots$) , 且 $\lim_{k\to\infty} f_k = f$, 则 $f \in \mathscr{F}$.

例 3 (Gaussian 积分)

$$\int_{-\infty}^{+\infty} \mathrm{e}^{-x^2}\mathrm{d}x = \sqrt{\pi}$$

证明

设 $f(x,y) = y\mathrm{e}^{-(1+x^2)y^2}$. 则 f 在 $\mathbb{R}^2$ 上非负.
$\int_0^{+\infty}\left(\int_0^{+\infty} f(x,y)\mathrm{d}y\right)\mathrm{d}x = \frac{\pi}{4}$.

续证

由 Tonelli 定理知 $\int_{(0,+\infty)^2} f(x,y)\mathrm{d}x\mathrm{d}y = \frac{\pi}{4}$, 故可交换积分次序,
从而有 $\left(\int_0^{+\infty} e^{-x^2}dx\right)^2 = \frac{\pi}{4}$.

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Figure 插图与 TikZ 绘图

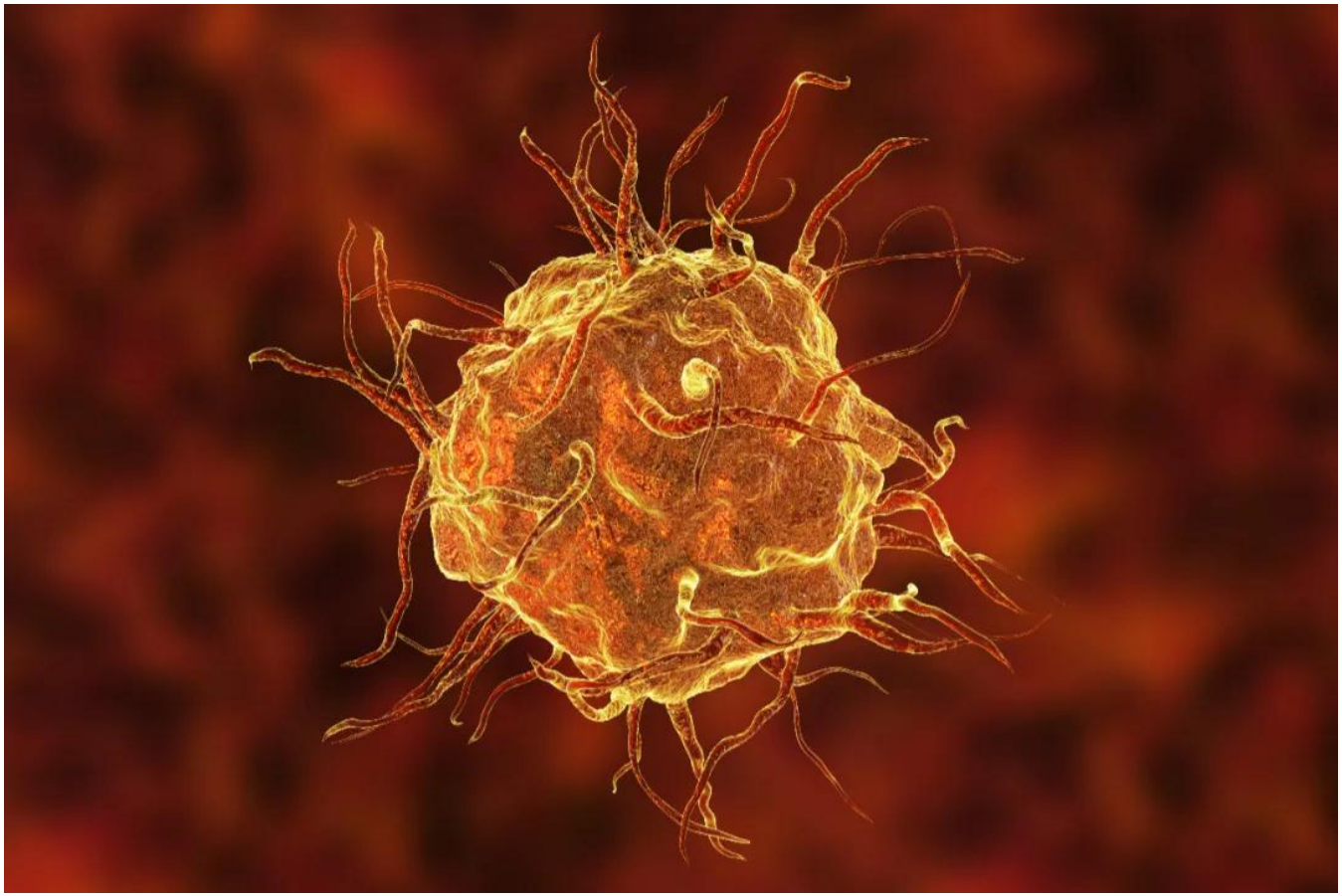

Figura: Phagocyte

Note: KATERYNAKON/SCIENCE PHOTO LIBRARY/GETTY

TikZ 绘图

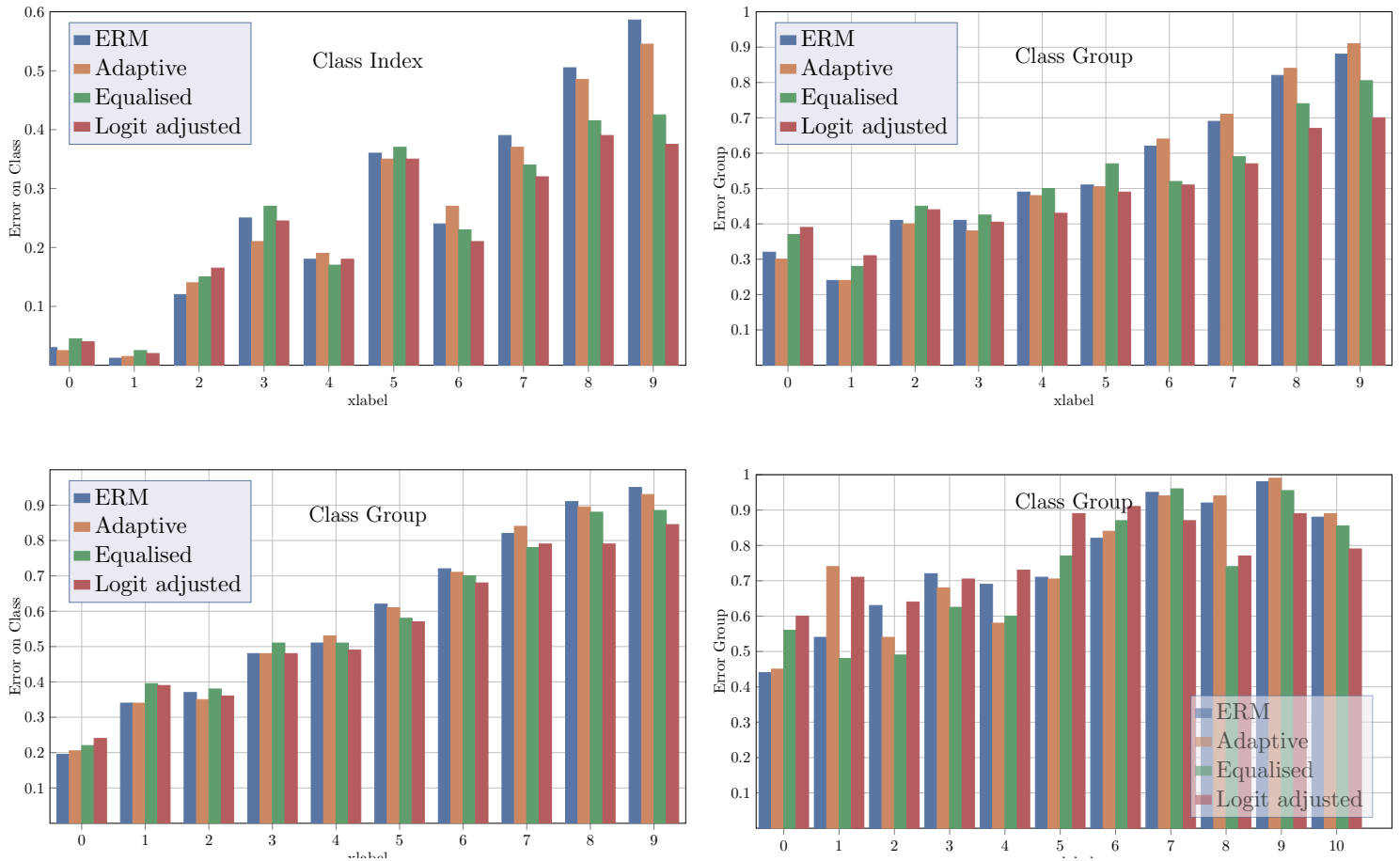

Figura: Comparison of different data.

KATERYNAKON/SCIENCE PHOTO LIBRARY/GETTY

TikZ 绘图

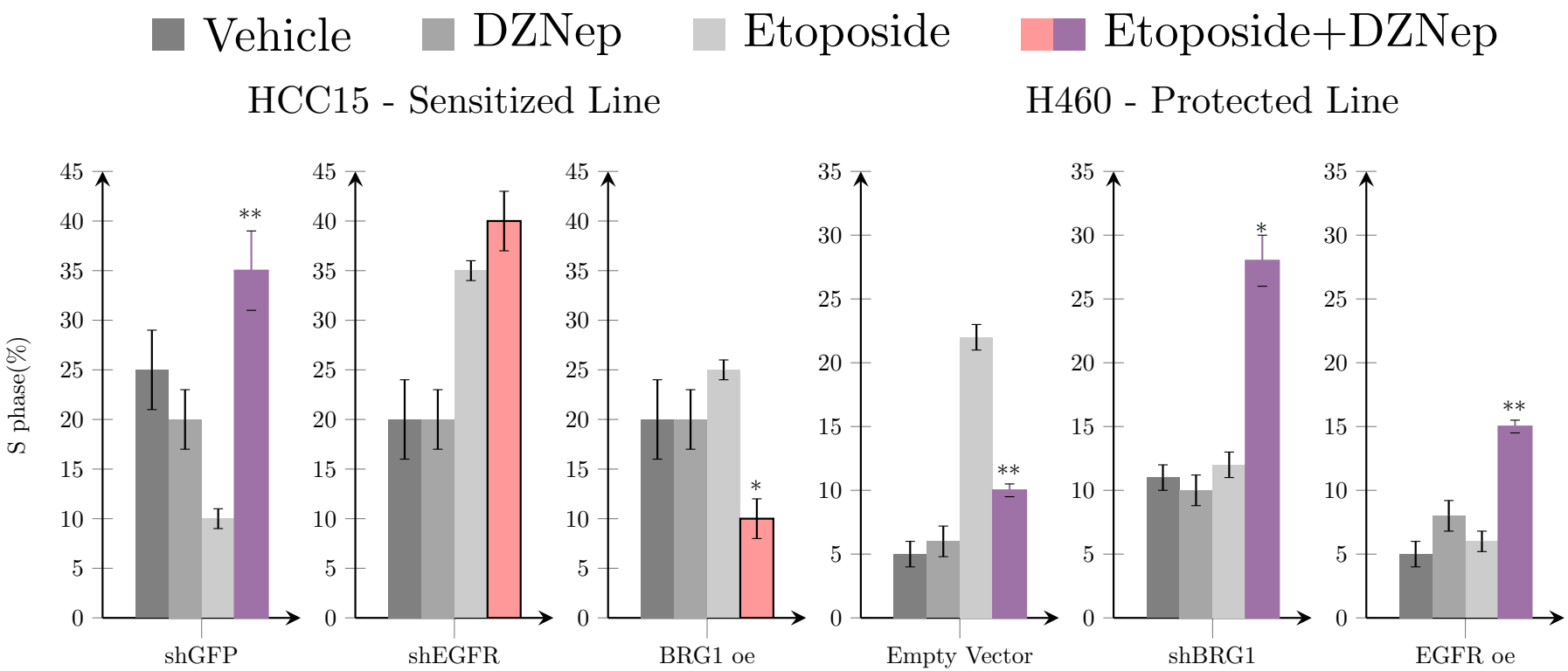

Figura: Comparison of different data.

数据与 tabular 环境

Category of your contents	Different types of each Category	other type of your data
	$\text{tha}\vartheta^{-1}\text{kg}$	
Type of date (numbers)	$0.0056 \pm 0.0097, 0.0021 \pm 4.0056$	3.5×10^5 ; 5.43 (9.30%)
	$0.0056 \pm 0.0097, 0.0021 \pm 4.0056$	3.5×10^5 ; 5.43 (9.30%)
	$0.0056 \pm 0.0097, 0.0021 \pm 4.0056$	3.5×10^5 ; 5.43 (9.30%)
	$0.0056 \pm 0.0097, 0.0021 \pm 4.0056$	3.5×10^5 ; 5.43 (9.30%)
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	$0.0056 \pm 0.0097, 0.0021 \pm 4.0056$	3.5×10^5 ; 5.43 (9.30%)
Mathematical formulas	$\frac{\mu^2}{\pi-2\vartheta} \times \sqrt[3]{\lVert v_i - \hat{\varphi} \rVert} + \lim_{s\to\infty} \int_0^{+\infty} f(x)e^{xsi}\,\mathrm{d}x$	$f(x) \in C^1[0,+\infty], \lVert f(x^n) \rVert_2 \leqslant \hbar$
	$\frac{\mu^2}{\pi-2\vartheta} \times \sqrt[3]{\lVert v_i - \hat{\varphi} \rVert} + \lim_{s\to\infty} \int_0^{+\infty} f(x)e^{xsi}\,\mathrm{d}x$	$f(x) \in C^1[0,+\infty], \lVert f(x^n) \rVert_2 \leqslant \hbar$
	$\frac{\mu^2}{\pi-2\vartheta} \times \sqrt[3]{\lVert v_i - \hat{\varphi} \rVert} + \lim_{s\to\infty} \int_0^{+\infty} f(x)e^{xsi}\,\mathrm{d}x$	$f(x) \in C^1[0,+\infty], \lVert f(x^n) \rVert_2 \leqslant \hbar$
Language description	This is the element described in your language	Mathematical language description
	This is the element described in your language	Mathematical language description
	This is the element described in your language	Mathematical language description
	This is the element described in your language	Mathematical language description
	This is the element described in your language	Mathematical language description
	This is the element described in your language	Mathematical language description
	This is the element described in your language	Mathematical language description
Projection data	3.5×10^5 This is the element described in your language	$0.0056 \pm 0.0097, 0.0021 \pm 4.0056$
	3.5×10^5 This is the element described in your language	$0.0056 \pm 0.0097, 0.0021 \pm 4.0056$
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Tabela: Contents of different types of tables.

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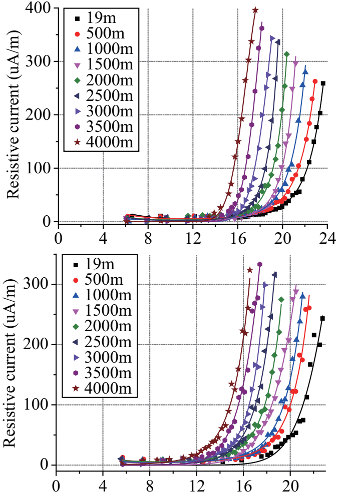

Figura: WMA method overview.

Tract category (tract#)	Tract name	
0.0056 ± 0.0097, 0.0021 ± 4.0056	0.0056 ± 0.0097, 0.0021 ± 4.0056	0.0056 ± 0.0097, 0.0021 ± 4.0056
0.0056 ± 0.0097, 0.0021 ± 4.0056	0.0056 ± 0.0097, 0.0021 ± 4.0056	0.0056 ± 0.0097, 0.0021 ± 4.0056
0.0056 ± 0.0097, 0.0021 ± 4.0056	0.0056 ± 0.0097, 0.0021 ± 4.0056	0.0056 ± 0.0097, 0.0021 ± 4.0056
0.0056 ± 0.0097, 0.0021 ± 4.0056	0.0056 ± 0.0097, 0.0021 ± 4.0056	0.0056 ± 0.0097, 0.0021 ± 4.0056
0.0056 ± 0.0097, 0.0021 ± 4.0056	0.0056 ± 0.0097, 0.0021 ± 4.0056	0.0056 ± 0.0097, 0.0021 ± 4.0056
0.0056 ± 0.0097, 0.0021 ± 4.0056	0.0056 ± 0.0097, 0.0021 ± 4.0056	0.0056 ± 0.0097, 0.0021 ± 4.0056
0.0056 ± 0.0097, 0.0021 ± 4.0056	0.0056 ± 0.0097, 0.0021 ± 4.0056	0.0056 ± 0.0097, 0.0021 ± 4.0056
0.0056 ± 0.0097, 0.0021 ± 4.0056	0.0056 ± 0.0097, 0.0021 ± 4.0056	0.0056 ± 0.0097, 0.0021 ± 4.0056
0.0056 ± 0.0097, 0.0021 ± 4.0056	0.0056 ± 0.0097, 0.0021 ± 4.0056	0.0056 ± 0.0097, 0.0021 ± 4.0056
0.0056 ± 0.0097, 0.0021 ± 4.0056	0.0056 ± 0.0097, 0.0021 ± 4.0056	0.0056 ± 0.0097, 0.0021 ± 4.0056
0.0056 ± 0.0097, 0.0021 ± 4.0056	0.0056 ± 0.0097, 0.0021 ± 4.0056	0.0056 ± 0.0097, 0.0021 ± 4.0056
0.0056 ± 0.0097, 0.0021 ± 4.0056	0.0056 ± 0.0097, 0.0021 ± 4.0056	0.0056 ± 0.0097, 0.0021 ± 4.0056
3.5×10^5 ; 5.43 (9.30%)	3.5×10^5 This is the element described in your language	
3.5×10^5 ; 5.43 (9.30%)	3.5×10^5 This is the element described in your language	
3.5×10^5 ; 5.43 (9.30%)	3.5×10^5 This is the element described in your language	
3.5×10^5 ; 5.43 (9.30%)	3.5×10^5 This is the element described in your language	
3.5×10^5 ; 5.43 (9.30%)	3.5×10^5 This is the element described in your language	
3.5×10^5 This is the element described in your language Contents of different types of tables		
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0.0056 ± 0.0097, 0.0021 ± 4.0056	0.0056 ± 0.0097, 0.0021 ± 4.0056	0.0056 ± 0.0097, 0.0021 ± 4.0056
0.0056 ± 0.0097, 0.0021 ± 4.0056	0.0056 ± 0.0097, 0.0021 ± 4.0056	0.0056 ± 0.0097, 0.0021 ± 4.0056
0.0056 ± 0.0097, 0.0021 ± 4.0056	0.0056 ± 0.0097, 0.0021 ± 4.0056	0.0056 ± 0.0097, 0.0021 ± 4.0056
0.0056 ± 0.0097, 0.0021 ± 4.0056	0.0056 ± 0.0097, 0.0021 ± 4.0056	0.0056 ± 0.0097, 0.0021 ± 4.0056
0.0056 ± 0.0097, 0.0021 ± 4.0056	0.0056 ± 0.0097, 0.0021 ± 4.0056	0.0056 ± 0.0097, 0.0021 ± 4.0056
0.0056 ± 0.0097, 0.0021 ± 4.0056	0.0056 ± 0.0097, 0.0021 ± 4.0056	0.0056 ± 0.0097, 0.0021 ± 4.0056
0.0056 ± 0.0097, 0.0021 ± 4.0056	0.0056 ± 0.0097, 0.0021 ± 4.0056	0.0056 ± 0.0097, 0.0021 ± 4.0056
0.0056 ± 0.0097, 0.0021 ± 4.0056	0.0056 ± 0.0097, 0.0021 ± 4.0056	0.0056 ± 0.0097, 0.0021 ± 4.0056
0.0056 ± 0.0097, 0.0021 ± 4.0056	0.0056 ± 0.0097, 0.0021 ± 4.0056	0.0056 ± 0.0097, 0.0021 ± 4.0056
0.0056 ± 0.0097, 0.0021 ± 4.0056	0.0056 ± 0.0097, 0.0021 ± 4.0056	0.0056 ± 0.0097, 0.0021 ± 4.0056
0.0056 ± 0.0097, 0.0021 ± 4.0056	0.0056 ± 0.0097, 0.0021 ± 4.0056	0.0056 ± 0.0097, 0.0021 ± 4.0056
0.0056 ± 0.0097, 0.0021 ± 4.0056	0.0056 ± 0.0097, 0.0021 ± 4.0056	0.0056 ± 0.0097, 0.0021 ± 4.0056

Tabela: Contents of different types of tables.

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Algoritmos 代码

```
   input  : x: float, y: float
   output: r: float
1  while True do
2  |   r = x + y;
3  |   if r >= 30 then
4  |   |   “O valor de r é maior ou iqual a 10.”;
5  |   |   break;
6  |   else
7  |   |   “O valor de r = ”, r;
8  |   end
9  end
```

Algorithm 1: Algorithm Example

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Python 代码

```python
import numpy as np
import matplotlib.pyplot as plt
N = 10
data = np.random.random((N, 4))
labels = ['point{0}'.format(i) for i in range(N)]
plt.subplots_adjust(bottom = 0.1)
plt.scatter( data[:, 0], data[:, 1], marker = 'o', c = data[:, 2], s = data[:, 3]*1500,
    cmap = plt.get_cmap('Spectral'))
for label, x, y in zip(labels, data[:, 0], data[:, 1]):
    plt.annotate( label,  xy = (x, y), xytext = (-20, 20),
        textcoords = 'offset points', ha = 'right', va = 'bottom',
        bbox = dict(boxstyle = 'round,pad=0.5', fc = 'yellow', alpha = 0.5),
        arrowprops = dict(arrowstyle = '->', connectionstyle = 'arc3,rad=0'))
plt.show()
```

code/main.py

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C 语言代码

```c
#include <stdio.h>
int main()
{
    int i,j,k,n;
    for(i=100;i<1000;i++)
    {
        j=i%10;
        k=i/10%10;
        n=i/100;
        if(j*j*j+k*k*k+n*n*n==i)
            printf("%5d\n",i);
    }
    return 0;
```

code/source.c

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Java 语言代码

```java
import java.io.File;
public class Main {
    public static void main(String[] argv) throws Exception
    {
        System.out.println("遍历目录");
        File dir = new File("/www/java"); //要遍历的目录
        visitAllDirsAndFiles(dir);
    }
    public static void visitAllDirsAndFiles(File dir) {
        System.out.println(dir);
        if (dir.isDirectory()) {
            String[] children = dir.list();
            for (int i = 0; i < children.length; i++) {
                visitAllDirsAndFiles(new File(dir, children[
    i]));
            }
        }
    }
}
```

code/helloworld.java

HTML 代码

```html
<!DOCTYPE html>
<html lang="en">
<head>
    <meta charset="UTF-8">
    <meta name="viewport" content="width=device-width,
    initial-scale=1.0">
    <title>Document</title>
</head>
    <body>
        <h1>My First HTML</h1>
    </body>
</html>
```

code/index.html

参考文献 I

[1] Albert Einstein. “Zur Elektrodynamik bewegter Körper. (German) [On the electrodynamics of moving bodies]”. Em: *Annalen der Physik* 322.10 (1905), 891–921. DOI: {http://dx.doi.org/10.1002/andp.19053221004}.

[2] Universidade Federal do Ceará. *Identidade Visual da UFC*. http://www.ufc.br/. Online; acessado em 26 de Dezembro de 2020. 2020.

[3] Karl von Meyenn. “Zur Elektrodynamik bewegter Körper”. Em: *Albert Einsteins Relativitätstheorie: Die grundlegenden Arbeiten*. Ed. por Karl von Meyenn. Wiesbaden: Vieweg+Teubner Verlag, 1990, pp. 124–155. ISBN: 978-3-322-83770-7. DOI: 10.1007/978-3-322-83770-7_4. URL: https://doi.org/10.1007/978-3-322-83770-7_4.

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致谢!

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