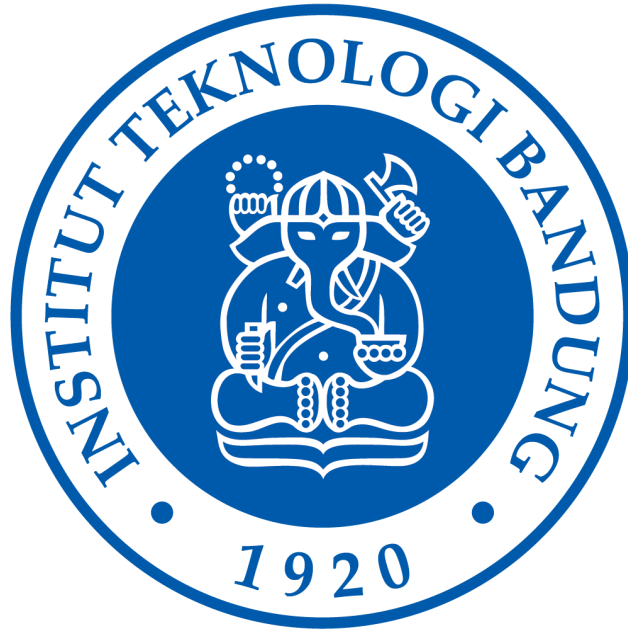# Laporan Tugas Kecil 1

# IF 2211 Strategi Algoritma

**Penyelesaian Permainan Kartu 24 dengan Algoritma Brute Force**

Disusun oleh:

Ahmad Ghulam Ilham          13521118

**Semester II Tahun 2022/2023**

**Sekolah Teknik Elektro dan Informatika**

**Institut Teknologi Bandung**

# BAB 1

Teori Singkat

## Algoritma Brute Force

Algoritma Brute force: pendekatan yang lempang (straightforward) untuk memecahkan suatu persoalan

Biasanya algoritma brute force didasarkan pada:

- Pernyataan pada persoalan (problem statement)
- Definisi/konsep yang dilibatkan.

Algoritma brute force memecahkan persoalan dengan:

- Sangat sederhana
- Langsung
- Jelas caranya (obvious way).
- Just do it! atau Just Solve it!

Pada tugas kecil ini, berikut adalah langkah-langkah brute force yang digunakan:

1. Melakukan permutasi secara rekursif untuk mendapatkan semua kemungkinan urutan dari 4 angka
2. Melakukan kombinasi secara looping untuk mendapatkan semua kemungkinan urutan 3 dari 4 operator
3. Mengecek semua kemungkinan urutan antara 4 angka dan 3 operator dengan 5 jenis pengelompokkan operasi (berdasarkan posisi tanda kurung)

IF2123 - Aljabar Linier dan Geometri

# BAB 2

## Implementasi Program

I. Calculation

```java
// Menghitung Ekspresi
public static double calc(double ope1, double ope2, String opr) {
    if (opr == "+") {
        return ope1+ope2;
    }
    if (opr == "-") {
        return ope1-ope2;
    }
    if (opr == "*") {
        return ope1*ope2;
    }
    if (opr == "/") {
        if (ope2 != 0) {
            return ope1/ope2;
        }
        else {
            return 0.0d;
        }
    }
    else {
        return 0.0d;
    }
}
```

IF2123 - Aljabar Linier dan Geometri

```
// Bentuk ((a op b) op c) op d
public static double form1(NumArr numArr, StrArr oprArr) {
    double a = calc(numArr.Arr[0], numArr.Arr[1], oprArr.Arr[0]);
    double b = calc(a, numArr.Arr[2], oprArr.Arr[1]);
    double res = calc(b, numArr.Arr[3], oprArr.Arr[2]);
    return res;
}
// Bentuk (a op (b op c)) op d
public static double form2(NumArr numArr, StrArr oprArr) {
    double a = calc(numArr.Arr[1], numArr.Arr[2], oprArr.Arr[1]);
    double b = calc(numArr.Arr[0], a, oprArr.Arr[0]);
    double res = calc(b, numArr.Arr[3], oprArr.Arr[2]);
    return res;
}
// Bentuk a op ((b op c) op d)
public static double form3(NumArr numArr, StrArr oprArr) {
    double a = calc(numArr.Arr[1], numArr.Arr[2], oprArr.Arr[1]);
    double b = calc(a, numArr.Arr[3], oprArr.Arr[2]);
    double res = calc(numArr.Arr[0], b, oprArr.Arr[0]);
    return res;
}
// Bentuk a op (b op (c op d))
public static double form4(NumArr numArr, StrArr oprArr) {
    double a = calc(numArr.Arr[2], numArr.Arr[3], oprArr.Arr[2]);
    double b = calc(numArr.Arr[1], a, oprArr.Arr[1]);
    double res = calc(numArr.Arr[0], b, oprArr.Arr[0]);
    return res;
}
// Bentuk (a op b) op (c op d)
public static double form5(NumArr numArr, StrArr oprArr) {
    double a = calc(numArr.Arr[0], numArr.Arr[1], oprArr.Arr[0]);
    double b = calc(numArr.Arr[2], numArr.Arr[3], oprArr.Arr[2]);
    double res = calc(a, b, oprArr.Arr[1]);
    return res;
}
```

II.     Main

```
public static void main(String[] args) {

    StrArr oprArr = new StrArr(len: 4);
    oprArr.Arr[0] = "+";
    oprArr.Arr[1] = "-";
    oprArr.Arr[2] = "*";
    oprArr.Arr[3] = "/";

    // NumArr numArr = RNG.getNumArr();

    NumArr numArr = new NumArr(len: 4);
    numArr.Arr[0] = 6.0d;
    numArr.Arr[1] = 6.0d;
    numArr.Arr[2] = 6.0d;
    numArr.Arr[3] = 6.0d;


    Permutation.perm(n: 4, numArr, oprArr, delimiter: ',');
```

IF2123 - Aljabar Linier dan Geometri

## III. NumArr

```java
double[] Arr = new double[100];
int len;

NumArr(int Len) {
    this.len = Len;
}

public int getLen() {
    return this.len;
}

public void setLen(int len) {
    this.len = Len;
}
```

```java
public static void printNumArr(NumArr array) {

    System.out.print(s: "[");
    for (int i = 0; i < array.len; i++) {
        System.out.print(array.Arr[i]);
        if (i < array.len-1) {
            System.out.print(s: ", ");
        } else {
            System.out.print(s: "]");
        }
    }
    System.out.println();
}
```

## IV. Permutation

```java
public static void perm(int n, NumArr numArr, StrArr oprArr, char delimiter)
    StrArr curOpr = new StrArr(len: 3);
    if (n == 1) {
        // NumArr.printNumArr(numArr);
        for (int i = 0; i < oprArr.len; i++) {
            for (int j = 0; j < oprArr.len; j++) {
                for (int k = 0; k < oprArr.len; k++) {
                    curOpr.Arr[0] = oprArr.Arr[i];
                    curOpr.Arr[1] = oprArr.Arr[j];
                    curOpr.Arr[2] = oprArr.Arr[k];
                    int a = (int) numArr.Arr[0];
                    String op1 = curOpr.Arr[0];
                    int b = (int) numArr.Arr[1];
                    String op2 = curOpr.Arr[1];
                    int c = (int) numArr.Arr[2];
                    String op3 = curOpr.Arr[2];
                    int d = (int) numArr.Arr[3];
                    double res1 = Calculation.form1(numArr, curOpr);
                    if (res1 == 24) {
                        String str1 = "(("+a+op1+b+")"+op2+c+")"+op3+d;
                        System.out.println(str1);
                        // StrArr.addElmt()
                    }
                    double res2 = Calculation.form2(numArr, curOpr);
                    if (res2 == 24) {
                        String str2 = "("+a+op1+"("+b+op2+c+"))"+op3+d;
                        System.out.println(str2);
                    }
```

```java
                    double res3 = Calculation.form3(numArr, curOpr);
                    if (res3 == 24) {
                        String str2 = a+op1+"(("+b+op2+c+")"+op3+d+")";
                        System.out.println(str2);
                    }
                    double res4 = Calculation.form4(numArr, curOpr);
                    if (res4 == 24) {
                        String str2 = a+op1+"("+b+op2+"("+c+op3+d+"))";
                        System.out.println(str2);
                    }
                    double res5 = Calculation.form5(numArr, curOpr);
                    if (res5 == 24) {
                        String str2 = "("+a+op1+b+")"+op2+"("+c+op3+d+")";
                        System.out.println(str2);
                    }
                }
            }
        }
    } else {
        for (int i = 0; i < n - 1; i++) {
            perm(n - 1, numArr, oprArr, delimiter);
            if (n % 2 == 0) {
                swap(numArr, i, n - 1);
            } else {
                swap(numArr, a: 0, n - 1);
            }
        }
        perm(n - 1, numArr, oprArr, delimiter);
    }
```

```java
private static void swap(NumArr array, int a, int b) {
    double tmp = array.Arr[a];
    array.Arr[a] = array.Arr[b];
    array.Arr[b] = tmp;
}
```

## V.   RNG

```java
public static double getNumber() {
    int min = 1;
    int max = 13;
    int i = (int)Math.floor(Math.random() * (max - min + 1) + min);
    double num = Double.valueOf(i);
    return num;
}

public static NumArr getNumArr() {
    NumArr numArr = new NumArr(len: 4);
    for (int i = 0; i < 4; i++) {
        double num = getNumber();
        numArr.Arr[i] = num;
    }
    return numArr;
}
```

## VI.   Save

```java
public static void savePromt(StrArr array) throws IOException {
    String prompt;
    boolean back = false;
    System.out.println(x: "\nApakah ingin menyimpan solusi? (Y/N) : ");
    do {
        Scanner scanner = new Scanner(System.in);
        prompt = scanner.nextLine().toLowerCase();
        if (prompt.equals(anObject: "y")) {
            System.out.println(x: "Masukkan nama file (.txt)");
            String fileName = scanner.nextLine();
            // Algoritma save to file isi disini
            writeFile(fileName, array);
            back = true;
        } else if (prompt.equals(anObject: "n")) {
            back = true;
        }
    } while (!back);
}

public static void writeFile(String fileName, StrArr array) {
    try (FileWriter writer = new FileWriter("../Tucil1_13521118/test/" + fileName)) {
        writer.write(str: "Solusi:\n");
        for (int i = 1; i < array.len; i++) {

        }
        writer.write(str: "\n");
        writer.write("Berhasil menyimpan solusi pada " + fileName);
        writer.close();
    } catch (IOException e) {
        e.printStackTrace();
    }
}
```

IF2123 - Aljabar Linier dan Geometri

## VII.    StrArr

```java
String[] Arr = new String[100];
int len;

StrArr(int len) {
    this.len = len;
}

public int getLen() {
    return this.len;
}

public void setLen(int len) {
    this.len = len;
}

public static StrArr addElmt(StrArr array, String x) {
    int n = array.len;
    StrArr newArr = new StrArr(n+1);
    for (int i = 0; i < n; i++)
        newArr.Arr[i] = array.Arr[i];
    newArr.Arr[n] = x;
    return newArr;
}
```

```java
public static void printStrArr(StrArr array) {

    System.out.print(s: "[");
    for (int i = 0; i < array.len; i++) {
        System.out.print(array.Arr[i]);
        if (i < array.len-1) {
            System.out.print(s: ", ");
        } else {
            System.out.print(s: "]");
        }
    }
    System.out.println();
}
```

# BAB 3

Hasil

IF2123 - Aljabar Linier dan Geometri

```
13          NumArr numArr = new NumArr(len: 4);
14          numArr.Arr[0] = 8.0d;
15          numArr.Arr[1] = 8.0d;
16          numArr.Arr[2] = 8.0d;
17      💡  numArr.Arr[3] = 8.0d;
18
19
20          Permutation.perm(n: 4, numArr, oprArr, delimiter: ',');
21
22      }
23
```

PROBLEMS 5    OUTPUT    **TERMINAL**    JUPYTER    DEBUG CONSOLE

Microsoft Windows [Version 10.0.22621.1105]
(c) Microsoft Corporation. All rights reserved.

D:\Library\Kuliah\Semester 4\Stima\tucil>cd "d:\Library\Kuliah\Semester 4\St

d:\Library\Kuliah\Semester 4\Stima\tucil\src>

IF2123 - Aljabar Linier dan Geometri

**BAB 4**

Link Repositry

| Poin | Ya | Tidak |
|---|---|---|
| 1. Program berhasil dikompilasi tanpa kesalahan | ✓ | |
| 2. Program berhasil running | ✓ | |
| 3. Program dapat membaca input / generate sendiri dan memberikan luaran | | ✓ |
| 4. Solusi yang diberikan program memenuhi (berhasil mencapai 24) | | ✓ |
| 5. Program dapat menyimpan solusi dalam file teks | | ✓ |

https://github.com/Agilham/Tucil1_13521118.git

IF2123 - Aljabar Linier dan Geometri