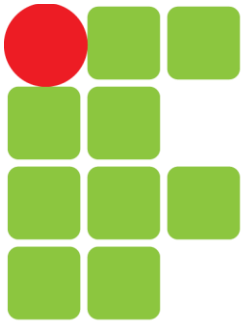


INSTITUTO FEDERAL
MINAS GERAIS
Campus Bambuí

Algorithm Ant Colony Optimization (ACO) OO

Programação Orientada a Objetos

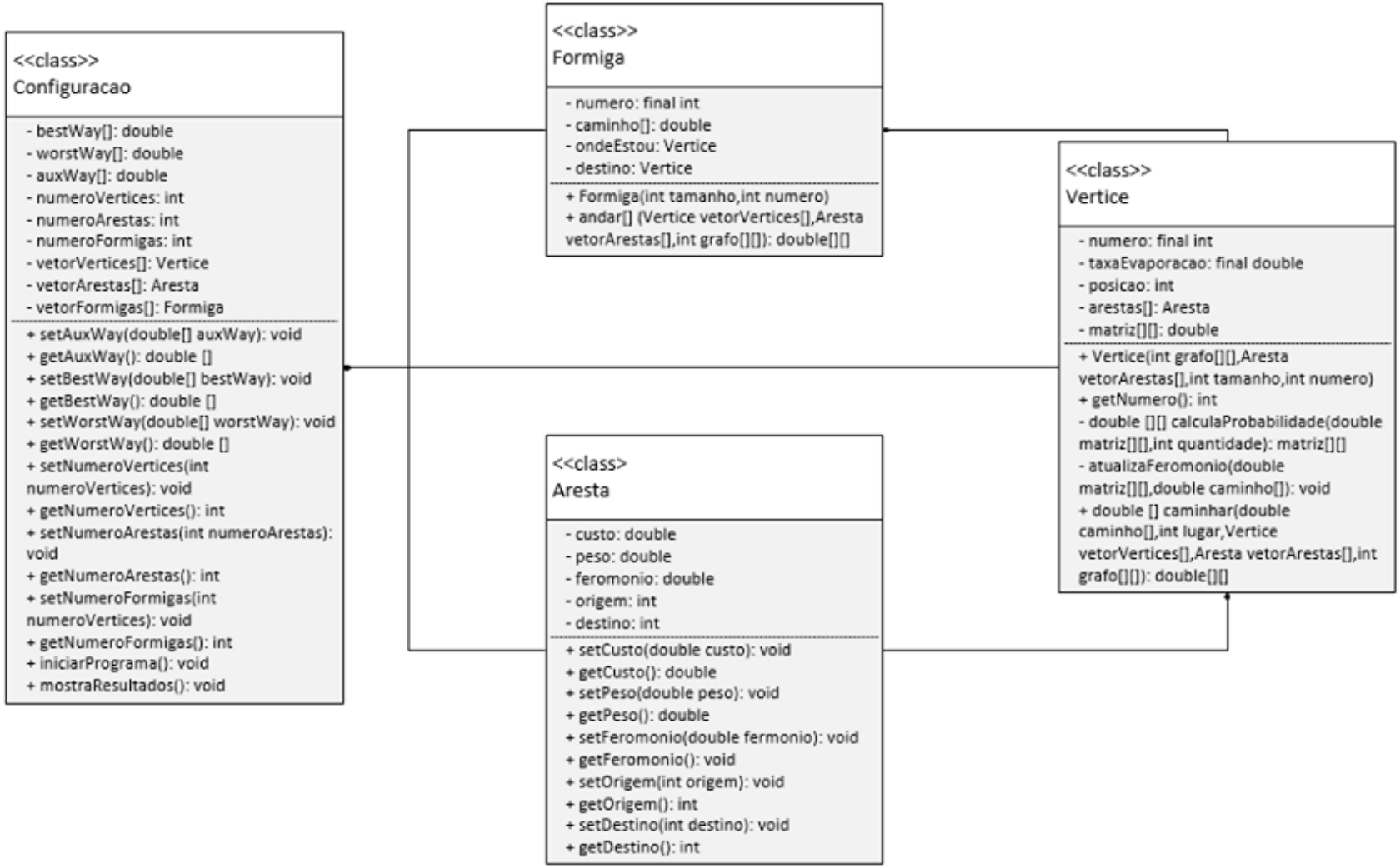
Engenharia da Computação - 04

Daniel Winter Santos Rocha

Rodrigo Matheus Rodrigues de Oliveira

Trabalho Final - Programação Orientada a Objetos

11 de dezembro de 2017



Daniel Winter,Rodrigo Matheus

TABELA GRAFO 1

Teste	Melhor Caminho	Custo	Pior Caminho	Custo
1	1, 5, 10, 20	3	1, 5, 17, 2, 6, 19, 10, 11, 7, 15, 14, 9, 20	73
2	1, 5, 10, 20	3	1, 14, 9, 3, 11, 8, 6, 2, 5, 10, 13, 19, 16, 15, 12, 20	73
3	1, 5, 10, 20	3	1, 12, 8, 16, 14, 19, 4, 7, 10, 17, 11, 9, 3, 15, 2, 6, 20	82
4	1, 5, 10, 20	3	1, 19, 9, 8, 10, 5, 14, 16, 11, 6, 2, 13, 15, 12, 20	77
5	1, 5, 10, 20	3	1, 17, 18, 11, 12, 2, 3, 4, 13, 10, 14, 19, 16, 20	69
6	1, 5, 10, 20	3	1, 18, 12, 9, 13, 10, 14, 16, 11, 15, 2, 20	70
7	1, 5, 10, 20	3	1, 15, 2, 6, 19, 14, 16, 12, 11, 8, 3, 4, 13, 9, 5, 10, 20	69
8	1, 5, 10, 20	3	1, 17, 18, 13, 19, 4, 9, 8, 14, 3, 10, 6, 20	73
9	1, 5, 10, 20	3	1, 19, 8, 16, 15, 10, 6, 12, 11, 18, 13, 7, 2, 20	75
10	1, 5, 10, 20	3	1, 5, 14, 3, 4, 13, 9, 10, 11, 17, 19, 15, 2, 2	75
11	1, 5, 10, 20	3	1, 15, 2, 7, 14, 11, 17, 18, 13, 10, 5, 4, 9, 8, 6, 20	84
12	1, 5, 10, 20	3	1, 14, 19, 13, 18, 12, 17, 8, 10, 5, 15, 2, 20	72
13	1, 5, 10, 20	3	1, 19, 8, 16, 6, 5, 3, 10, 15, 17, 2, 20	69
14	1, 5, 10, 20	3	1, 19, 15, 17, 10, 14, 3, 11, 6, 5, 4, 9, 8, 20	74
15	1, 5, 10, 20	3	1, 19, 15, 17, 18, 12, 5, 3, 4, 13, 9, 14, 11, 6, 20	71
16	1, 5, 10, 20	3	1, 12, 10, 2, 7, 18, 6, 5, 14, 9, 13, 16, 20	68
17	1, 5, 10, 20	3	1, 18, 11, 9, 8, 16, 6, 12, 2, 5, 4, 14, 17, 10, 20	68
18	1, 5, 10, 20	3	1, 18, 12, 8, 16, 6, 13, 9, 19, 4, 7, 15, 17, 2, 10, 20	79
19	1, 5, 10, 20	3	1, 12, 11, 4, 7, 5, 10, 14, 17, 15, 9, 8, 16, 6, 20	75
20	1, 5, 10, 20	3	1, 18, 5, 4, 7, 6, 12, 9, 13, 19, 8, 20	74
21	1, 5, 10, 20	3	1, 5, 4, 9, 8, 6, 19, 15, 2, 17, 13, 10, 11, 14, 20	78
22	1, 5, 10, 20	3	1, 5, 9, 11, 2, 13, 16, 12, 10, 17, 19, 15, 14, 20	75
23	1, 5, 10, 20	3	1, 17, 11, 9, 8, 16, 6, 5, 2, 15, 10, 18, 20	70
24	1, 5, 10, 20	3	1, 5, 3, 19, 4, 15, 17, 11, 18, 13, 9, 10, 2, 20	83
25	1, 5, 10, 20	3	1, 17, 10, 14, 13, 9, 19, 16, 15, 12, 8, 20	63
26	1, 5, 10, 20	3	1, 5, 17, 2, 7, 13, 19, 10, 11, 18, 16, 20	73
27	1, 5, 10, 20	3	1, 15, 2, 17, 8, 3, 5, 4, 13, 10, 18, 9, 19, 16, 20	72
28	1, 5, 10, 20	3	1, 7, 12, 2, 5, 9, 8, 18, 6, 19, 15, 14, 20	72
29	1, 5, 10, 20	3	1, 17, 15, 12, 7, 13, 16, 14, 5, 4, 9, 20	78
30	1, 5, 10, 20	3	1, 5, 15, 10, 11, 4, 13, 7, 12, 9, 14, 20	77
Resultados	Média	3	Média	73,7
	Desvio Padrão	0	Desvio Padrão	4,720827

TABELA GRAFO 2

Teste	Melhor Caminho	Custo	Pior Caminho	Custo
1	1, 84, 100	3	1, 81, 76, 33, 79, 12, 61, 46, 15, 24, 72, 14, 13, 23, 99, 82, 94, 21, 83, 58, 53, 66, 39, 42, 22, 32, 75, 19, 59, 54, 85, 10, 57, 36, 55, 77, 26, 30, 31, 98, 38, 62, 86, 47, 80, 28, 69, 40, 52, 27, 56, 100	191
2	1, 84, 100	3	1, 21, 10, 77, 90, 83, 19, 49, 61, 52, 18, 70, 75, 46, 44, 78, 50, 35, 72, 55, 56, 93, 99, 6, 92, 33, 66, 95, 37, 97, 42, 100	150
3	1, 84, 100	3	1, 32, 15, 39, 4, 58, 28, 38, 37, 44, 9, 91, 29, 55, 27, 42, 74, 53, 83, 24, 89, 41, 14, 6, 97, 23, 50, 11, 78, 49, 35, 40, 79, 13, 60, 46, 12, 22, 92, 45, 73, 100	177
4	1, 84, 100	3	1, 62, 25, 11, 59, 26, 46, 93, 80, 76, 87, 2, 23, 19, 24, 56, 97, 6, 48, 17, 9, 43, 72, 12, 16, 61, 5, 64, 10, 38, 30, 71, 47, 63, 66, 13, 41, 70, 40, 100,	163
5	1, 84, 100	3	1, 36, 71, 42, 18, 46, 61, 3, 66, 95, 70, 90, 8, 33, 38, 25, 19, 7, 87, 48, 26, 43, 74, 62, 60, 11, 45, 77, 50, 41, 67, 52, 13, 5, 93, 32, 49, 68, 9, 28, 100	160
6	1, 84, 100	3	1, 29, 67, 77, 39, 59, 79, 95, 66, 78, 26, 61, 18, 48, 96, 23, 28, 46, 30, 68, 54, 49, 47, 45, 86, 5, 76, 53, 8, 32, 58, 82, 85, 15, 31, 34, 13, 63, 100	164
7	1, 84, 100	3	1, 23, 97, 50, 94, 21, 63, 80, 58, 86, 27, 19, 7, 61, 87, 4, 48, 65, 72, 3, 11, 67, 98, 46, 44, 10, 75, 31, 14, 43, 71, 59, 5, 68, 12, 30, 8, 28, 38, 57, 100	186
8	1, 84, 100	3	1, 63, 98, 43, 85, 68, 59, 4, 13, 66, 58, 38, 33, 78, 49, 31, 83, 11, 39, 47, 93, 2, 41, 79, 21, 84, 42, 90, 35, 80, 100	169
9	1, 84, 100	3	1, 4, 9, 43, 3, 33, 90, 12, 45, 77, 26, 55, 78, 91, 28, 22, 21, 39, 2, 7, 13, 60, 30, 68, 94, 89, 5, 34, 44, 41, 27, 65, 16, 58, 6, 75, 49, 23, 73, 40, 11, 100	160
10	1, 84, 100	3	1, 48, 18, 13, 95, 93, 62, 34, 91, 52, 17, 35, 54, 60, 11, 89, 65, 23, 30, 86, 40, 92, 44, 26, 63, 94, 47, 36, 57, 49, 15, 8, 7, 100	159
11	1, 84, 100	3	1, 61, 18, 89, 96, 87, 33, 38, 70, 32, 10, 71, 43, 4, 35, 92, 47, 27, 3, 31, 44, 64, 34, 45, 60, 74, 81, 62, 66, 9, 7, 26, 100	165
12	1, 84, 100	3	1, 64, 22, 17, 13, 56, 54, 95, 70, 49, 48, 85, 63, 11, 36, 31, 24, 35, 94, 99, 23, 66, 82, 69, 86, 55, 27, 89, 26, 44, 19, 8, 98, 75, 90, 30, 15, 96, 100	173
13	1, 84, 100	3	1, 14, 66, 63, 52, 60, 5, 61, 62, 7, 9, 27, 75, 67, 92, 55, 38, 29, 85, 39, 21, 56, 32, 4, 80, 15, 45, 72, 68, 71, 43, 64, 83, 19, 17, 81, 41, 78, 100	166
14	1, 84, 100	3	1, 69, 90, 65, 82, 36, 46, 93, 63, 91, 75, 38, 5, 25, 11, 84, 83, 72, 68, 14, 70, 32, 27, 9, 56, 40, 41, 44, 62, 4, 74, 99, 23, 12, 47, 2, 71, 39, 42, 100	165
15	1, 84, 100	3	1, 51, 63, 37, 49, 43, 3, 46, 82, 74, 79, 68, 41, 16, 25, 15, 24, 21, 59, 10, 80, 76, 47, 14, 28, 13, 84, 23, 90, 77, 99, 91, 6, 35, 54, 94, 69, 60, 89, 96, 81, 100	178

16	1, 84, 100	3	1, 55, 52, 8, 13, 72, 78, 17, 98, 35, 34, 67, 48, 76, 60, 41, 54, 68, 21, 31, 15, 26, 64, 56, 28, 87, 86, 84, 2, 23, 57, 61, 7, 49, 32, 95, 70, 100	166
17	1, 84, 100	3	1, 19, 54, 93, 11, 78, 12, 2, 92, 80, 55, 52, 8, 28, 81, 63, 64, 97, 37, 30, 75, 24, 66, 42, 86, 25, 72, 76, 98, 7, 32, 39, 31, 33, 61, 9, 6, 10, 99, 60, 91, 90, 17, 21, 65, 100	180
18	1, 84, 100	3	1, 34, 41, 59, 10, 93, 39, 63, 30, 6, 92, 15, 98, 54, 48, 99, 69, 95, 38, 14, 28, 46, 88, 89, 51, 80, 82, 78, 50, 29, 76, 85, 100	154
19	1, 84, 100	3	1, 72, 94, 83, 82, 55, 99, 84, 27, 66, 15, 74, 52, 34, 23, 59, 51, 64, 37, 75, 65, 38, 24, 92, 98, 26, 35, 40, 44, 68, 62, 3, 90, 14, 25, 41, 70, 7, 8, 88, 95, 54, 81, 100	182
20	1, 84, 100	3	1, 56, 55, 50, 44, 2, 31, 41, 26, 53, 52, 66, 71, 94, 99, 89, 25, 47, 88, 81, 83, 58, 10, 5, 12, 24, 33, 61, 75, 91, 86, 79, 28, 39, 100	162
21	1, 84, 100	3	1, 52, 82, 91, 43, 69, 70, 58, 18, 88, 54, 23, 44, 79, 33, 97, 56, 32, 66, 68, 80, 46, 93, 99, 3, 65, 63, 95, 41, 26, 74, 30, 40, 39, 94, 19, 16, 13, 2, 37, 51, 98, 92, 55, 42, 100	158
22	1, 84, 100	3	1, 99, 25, 65, 84, 23, 85, 27, 74, 36, 71, 6, 10, 88, 78, 81, 93, 9, 67, 59, 33, 82, 24, 18, 52, 44, 26, 39, 46, 96, 54, 60, 63, 100	154
23	1, 84, 100	3	1, 16, 13, 80, 61, 79, 75, 63, 41, 85, 68, 90, 56, 54, 77, 46, 59, 3, 65, 97, 99, 44, 88, 7, 95, 10, 21, 4, 92, 15, 67, 100	156
24	1, 84, 100	3	1, 16, 72, 37, 45, 25, 99, 51, 79, 67, 77, 30, 92, 13, 40, 65, 64, 8, 70, 52, 57, 38, 93, 68, 22, 83, 60, 49, 26, 9, 87, 85, 100	164
25	1, 84, 100	3	1, 68, 72, 54, 74, 80, 58, 86, 18, 7, 96, 84, 78, 88, 32, 29, 21, 99, 8, 42, 57, 38, 30, 13, 81, 3, 73, 82, 28, 63, 43, 25, 50, 4, 36, 59, 5, 6, 93, 45, 67, 100	173
26	1, 84, 100	3	1, 22, 67, 73, 83, 44, 92, 55, 30, 49, 39, 62, 19, 18, 11, 31, 6, 51, 82, 71, 29, 36, 43, 87, 21, 74, 72, 68, 50, 12, 59, 98, 77, 69, 100	163
27	1, 84, 100	3	1, 69, 5, 6, 55, 15, 81, 36, 86, 57, 27, 23, 38, 43, 71, 97, 47, 89, 62, 13, 58, 99, 91, 10, 14, 93, 87, 70, 52, 96, 40, 3, 41, 74, 78, 80, 17, 42, 59, 49, 100	167
28	1, 84, 100	3	1, 31, 32, 93, 47, 26, 90, 7, 72, 48, 38, 42, 84, 24, 21, 56, 76, 13, 95, 68, 59, 6, 74, 30, 44, 19, 79, 99, 80, 73, 22, 35, 61, 57, 36, 82, 77, 23, 67, 8, 86, 37, 100	165
29	1, 84, 100	3	1, 84, 55, 97, 3, 88, 95, 38, 24, 74, 31, 7, 12, 27, 61, 79, 26, 36, 29, 4, 42, 52, 28, 9, 58, 70, 82, 57, 68, 87, 47, 17, 15, 45, 46, 72, 100	162
30	1, 84, 100	3	1, 78, 91, 61, 65, 14, 99, 85, 90, 8, 13, 49, 82, 34, 36, 92, 32, 48, 6, 93, 11, 42, 38, 84, 88, 80, 76, 37, 46, 69, 64, 59, 5, 16, 72, 31, 94, 39, 33, 44, 24, 100	167
Resultados	Média	3	Média	166,633
	Desvio Padrão	0	Desvio Padrão	9,70063