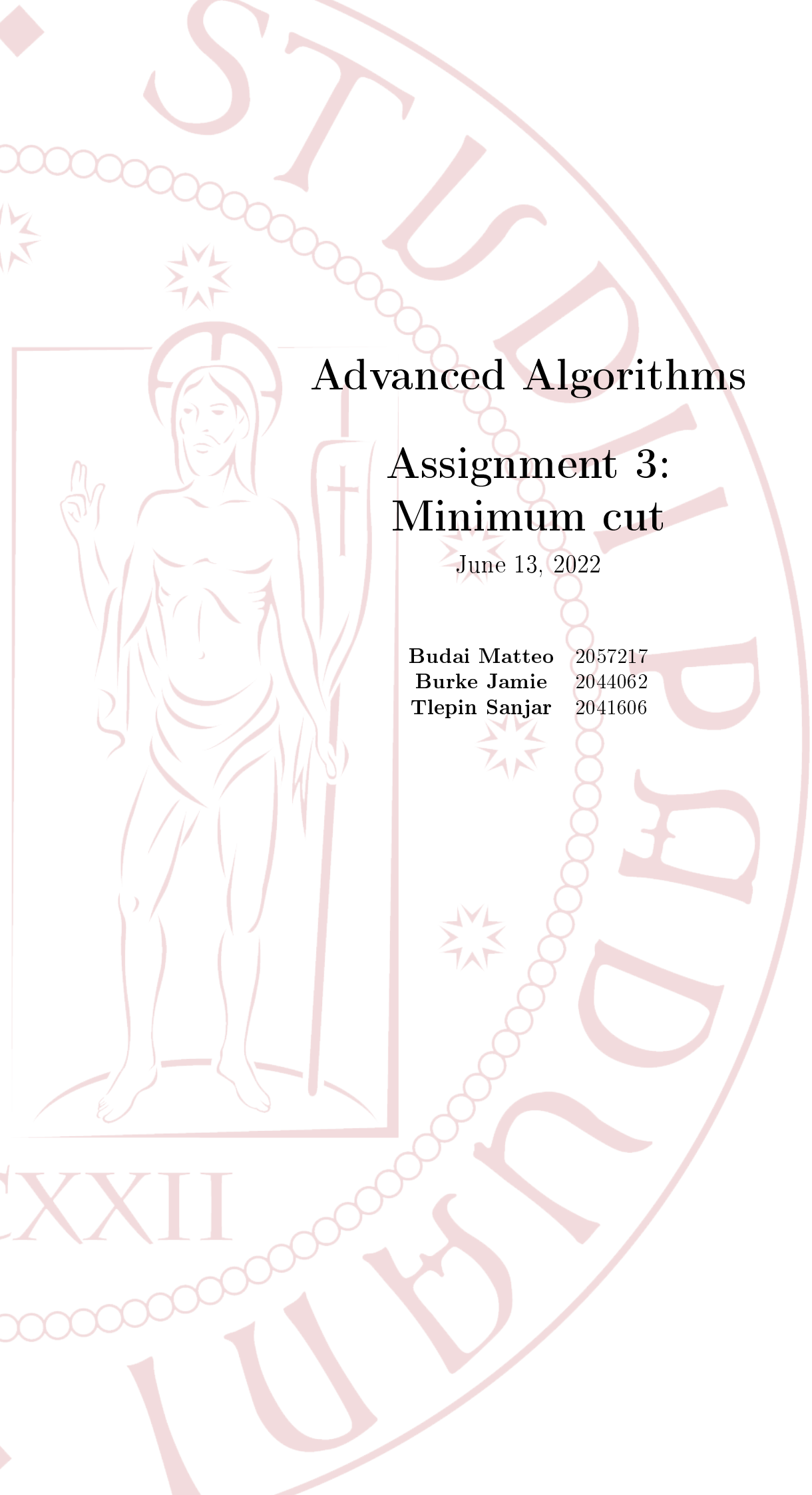

Advanced Algorithms

Assignment 3: Minimum cut

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Budai Matteo	2057217
Burke Jamie	2044062
Tlepin Sanjar	2041606

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1 Introduction

For this assignment, we implemented and analyzed the performance of two algorithms for the min-cut problem for weighted graphs. The algorithms implemented are:

1. Stoer and Wagner's Deterministic Algorithm;
2. Karger and Stein's Randomized Algorithm.

2 Stoer and Wagner's Deterministic Algorithm

2.1 Data Structure

2.2 Implementation

2.3 Complexity

3 Karger and Stein's Randomized Algorithm

```
1   KARGER (G,k)
2   A = +∞
3   for i = 1 to k:
4       t = RECURSIVE_CONTRACT(G)
5           if t < min:
6                   min = t
7   return min
8
9   RECURSIVE_CONTRACT(G=(D,W))
10  n= number of vertices in G
11  if n<=6:
12      Gp= CONTRACT(G,2)
13      return weight of the only edge (u,v) in Gp
14  t = n/√2+1
15  for i = 1 to 2:
16      Gi = CONTRACT(G,t)
17      wi = RECURSIVE_CONTRACT(Gi)
18  return min(w1,w2)
```

3.1 Data Structure

3.2 Implementation

3.3 Complexity

4 Results

4.1 Table with Min-Cut results

4.2 Graph of the Time Cost of the two Algorithms

4.3 Graph of the Time Cost compared to the Discovery Time of Karger and Stein Algorithm

4.4 Graph of the Time Cost compared to the Asymptotic Complexity of the two Algorithms

5 Conclusion