UNIVERSITY OF ZAGREB

Faculty of Electrical Engineering and Computing

Heuristic Optimization Methods

Labs: Fantasy Football Draft Problem

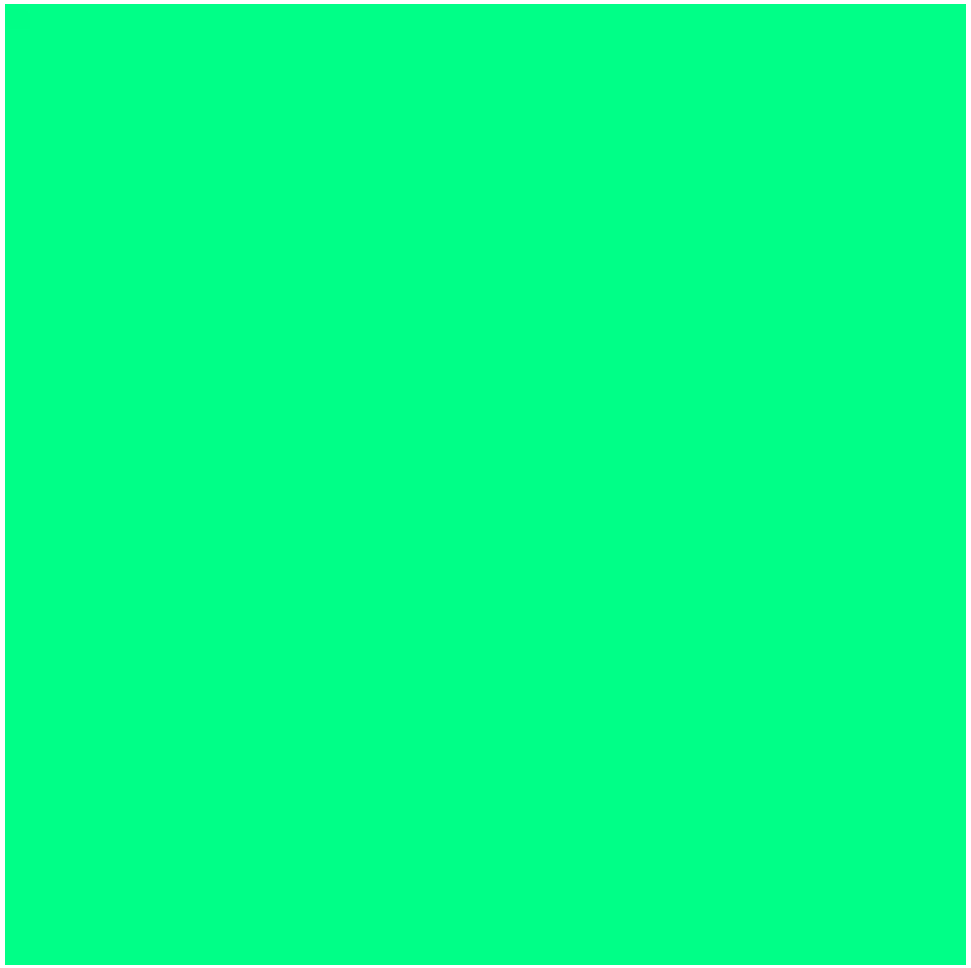
Master Programme

Academic year 2022/2023

Labs

- 2 lab assignments
  - Assignments are **mandatory**
  - **Threshold:** 25% out of 25 points
- **Lab1** (10 points)
  - Greedy algorithm and GRASP
- **Lab2** (15 points)
  - Tabu search and simulated annealing
- **Algorithm implementation and a report**
- **Students work individually!**

What is fantasy football?



- 100 million **budget**
- **...to buy** 15 players
- **No more than** 3 from each club
- **Pick starting 11**
- **They get** points **from** real life performances

Video taken from the Fantasy Premier League Twitter account

Problem instance

- Variant of the knapsack problem

ID	Position	Name	Club	Points	Price
1	GK	Ederson	Man City	13	6.0
2	GK	Alisson	Liverpool	17	5.9
3	GK	Pope	Burnley	15	5.5
...					
34	DEF	Alexander-Arnold	Liverpool	15	7.5
35	DEF	Robertson	Liverpool	25	7.1
36	DEF	van Dijk	Liverpool	15	6.4
...					
248	MID	Salah	Liverpool	48	12.3
249	MID	Mane	Liverpool	31	11.9
250	MID	Aubameyang	Arsenal	18	11.8
...					
485	FW	Kane	Spurs	60	10.8
486	FW	Agüero	Man City	2	10.4
...					

- Positions: goalkeeper (**GK**), defender (**DEF**), midfielder (**MID**), forward (**FW**)

Main objective

- Draft 15 players within a budget
- Choose the starting 11 players (best in each instance)
- **Objective:** Maximize the sum of points from the players selected in starting 11
- Points scored from substitutes do not count towards the main objective

Solution example

- List of 15 IDs (last 3 IDs are substitues)
- 1448 points

Constraints (1/2)

- **Budget**
  - 100 million available
  - Cost of drafted players must not exceed budget

- **Draft**
  - 15 players must be drafted (max 3 from single club)
    - 2 goalkeepers
    - 5 defenders
    - 5 midfielders
    - 3 forwards

Constraints (2/2)

- Starting 11
  - You can play in any formation
    - 1 goalkeeper
    - At least 3 defenders
    - At least 1 forward
  - Players can only play in positions defined by the instance

Report

- Best found results for each instance
  - Score and selected players
- Algorithm components
- Pseudocode
- Description
- Analysis

Additional information

- Task definition available on the course website
- Report template
- Programming language of your choice
- Solution checker
- Feel free to ask questions via the course MS Teams group