

METODI E MODELLI PER IL SUPPORTO ALLE DECISIONI

VQR OPTIMIZATION

Ghione Alessio, Mauti Enzo




PROJECT OBJECTIVE

Develop a metaheuristic algorithm based on local search to optimally select a subset of research outputs from the Department of Computer Science for the Research Quality Evaluation (VQR).


Context

The VQR is a national evaluation process of academic research. Each university department must submit a selection of research products. The selection must comply with specific selection constraints defined by the VQR rules and maximize the total score of the selected products.






THE CONSTRAINTS

- EACH RESEARCHER CAN BE ASSIGNED AT MOST P_{MAX} PRODUCTS
 - EACH PRODUCT CAN BE ASSIGNED ONLY ONCE
 - EACH DEPARTMENT CAN PRESENT AT MOST $[2.5 * N_{\text{RESEARCHER}}]$ PAPERS
 - EVALUATED ON A RESTRICTED TIME FRAME, 2020 - 2024 IN THIS SCENARIO
- 



GREEDY ALGORITHM

- WE LOOP OVER ALL THE DOCUMENTS IN ORDER FROM THE BETTER TO WORST AND TRY TO FIND SOMEONE TO PRESENT IT
 - WE CONTINUE UNTIL THE OBJECTIVE IS REACHED
- 



1ST EXCHANGE

— WE WANT TO MAKE SURE THAT EVERY PERSON TAKES ONLY THE BESTS PAPERS THEY CAN PRESENT.

— THE ALGORITHM TRIES TO REPLACE LOWER-VALUE PROPOSED PAPERS WITH HIGHER-VALUE UNPROPOSED PAPERS WRITTEN BY THE SAME PERSON.



2ND EXCHANGE

TRADES PAPERS BETWEEN DIFFERENT AUTHORS TO IMPROVE VALUE
DISTRIBUTION, AVOIDING UNDER/OVER-ASSIGNMENT

3RD EXCHANGE

— TRIES RECURSIVE PAPER SWAPPING CHAINS TO ALLOW HIGH-VALUE PAPERS TO REPLACE LOWER-VALUE ONES INDIRECTLY.

RESULTS

Domain	Product Types	Fields	Python Value	Solver Value	Python # Paper	Solver # Paper	Python Solver Time				Solver Time	Python Total Time	Solver Total Time
							Greedy	Ex1	Ex2	Ex3			
INFO	03a/03b	[0,6]	192,2	193,4	208	208	0,01	0,02	0,002	0,017	1,22	3,73	4,547
INFO	03a/03b/04a/04b	[0,6]	194,5	195,5	212	212	0,03	0,11	0,008	0,12	2,479	4,43	7,003
INFO	03a/03b	[all]	196,8	199,1	208	208	0,01	0,02	0,003	0,02	1,242	3,93	4,721
INFO	03a/03b/04a/04b	[all]	199,8	201,6	212	212	0,02	0,11	0,008	0,11	2,477	4,28	6,831
CHIM	03a/03b	[0,6]	265,4	266	267	267	0,05	0,29	0,025	0,26	4,138	3,61	9,412
CHIM	03a/03b/04a/04b	[0,6]	265,4	266	267	267	0,05	0,27	0,026	0,28	4,2	3,79	9,328
CHIM	03a/03b	[all]	266	266,4	267	267	0,05	0,25	0,026	0,24	4,177	3,74	9,239
CHIM	03a/03b/04a/04b	[all]	266	266,4	267	267	0,04	0,28	0,026	0,27	4,352	3,77	9,682
MATH	03a/03b	[0,6]	159,4	159,4	183	183	0,01	0,02	0,002	0,02	1,041	1,04	2,647
MATH	03a/03b/04a/04b	[0,6]	159,4	159,4	183	183	0,01	0,02	0,002	0,02	1,124	1,07	2,79
MATH	03a/03b	[all]	171,8	172	183	183	0,01	0,02	0,002	0,02	1,038	1,03	2,625
MATH	03a/03b/04a/04b	[all]	171,8	172	183	183	0,01	0,02	0,002	0,02	1,209	1,06	2,93
FISICA	03a/03b	[0,6]	233,3	233,5	235	235	0,08	0,5	0,01	0,49	3,91	5,65	11,654
FISICA	03a/03b/04a/04b	[0,6]	233,3	233,5	235	235	0,08	0,59	0,01	0,56	4,205	6,33	11,992
FISICA	03a/03b	[all]	234,2	234,4	235	235	0,07	0,52	0,01	0,53	4,105	5,65	12,131
FISICA	03a/03b/04a/04b	[all]	234,2	234,4	235	235	0,08	0,62	0,015	0,58	4,409	6,25	12,661

THANKS FOR YOUR ATTENTION