HUGO! Human Strategy based Genetic Optimizer

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HuGO!

Human strategy based Genetic Optimizer

1. Introduction
2. Human strategy based Genetic Optimizer
3. Why does the result qualify as being human-competitive ?
4. Conclusion:

   Why is this the "best" entry in comparison to others ?
5. HUGO! “live”

- M. Borschbach, C. Grelle, "Empirical Benchmarks of a Genetic Algorithm Incorporating Human Strategies", Technical Report no. 2009/01, University of Applied Sciences, Bergisch Gladbach, April 2009. http://www.fhdw.de/Borschbach.aspx

- M. Borschbach, C. Grelle, HUGO: A New Paradigma of Incorporating Human Strategies into Evolutionary Computation,Journal of Evolutionary Computation, submitted June 2009.

- C. Grelle, A Genetic Algorithm incorporating Human Strategies to solve discrete Optimization Problems applied to Rubik's Cube, Masterthesis, Institute of Computer Science, Münster 2009.

www.youtube.com

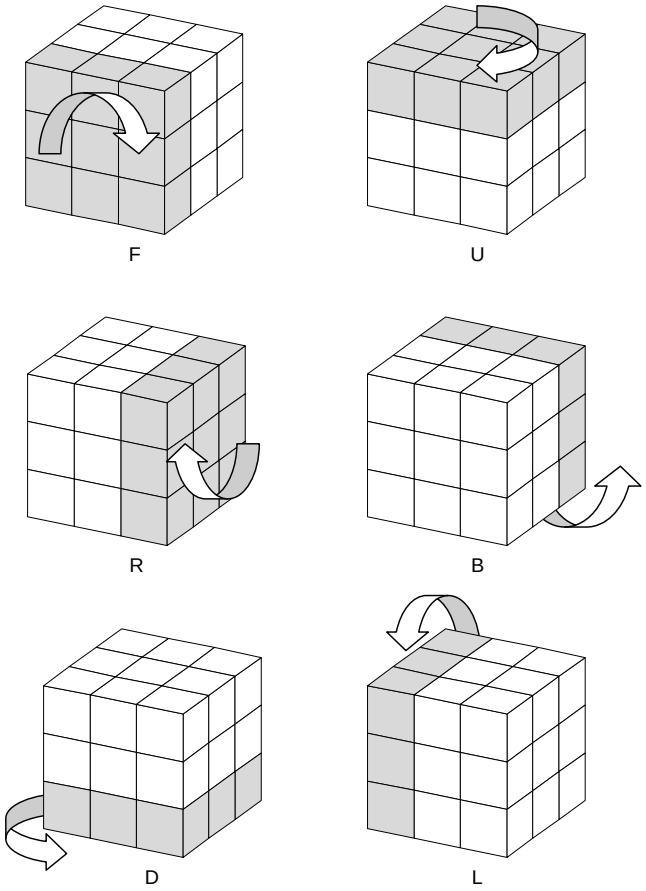
- Contestants use partical „human“ strategies to solve the cube
- Idea:

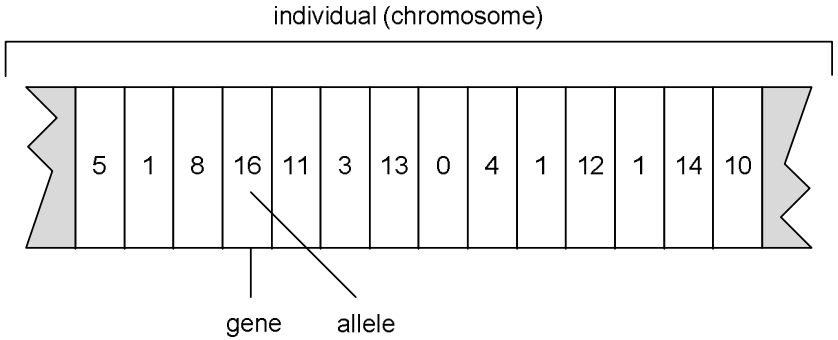
  Take human strategies and incorporate them into a genetic algorithm
- Result:

  Adaptation of genetic algorithms to human induced strategies

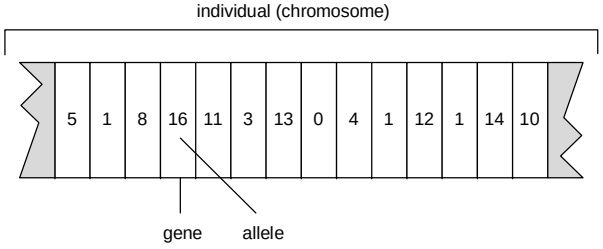
  → Symbiotic intelligence

- HUGO!: Human strategy based Genetic Optimizer





Clockwise quarter turns		Half turns		Counter-clockwise quarter turns	
F	0	F2	6	F’	12
U	1	U2	7	U’	13
R	2	R2	8	R’	14
B	3	B2	9	B’	15
D	4	D2	10	D’	16
L	5	L2	11	L’	17



HuGO!
Human strategy based Genetic Optimizer

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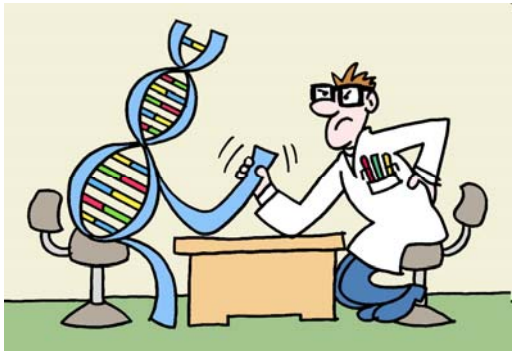
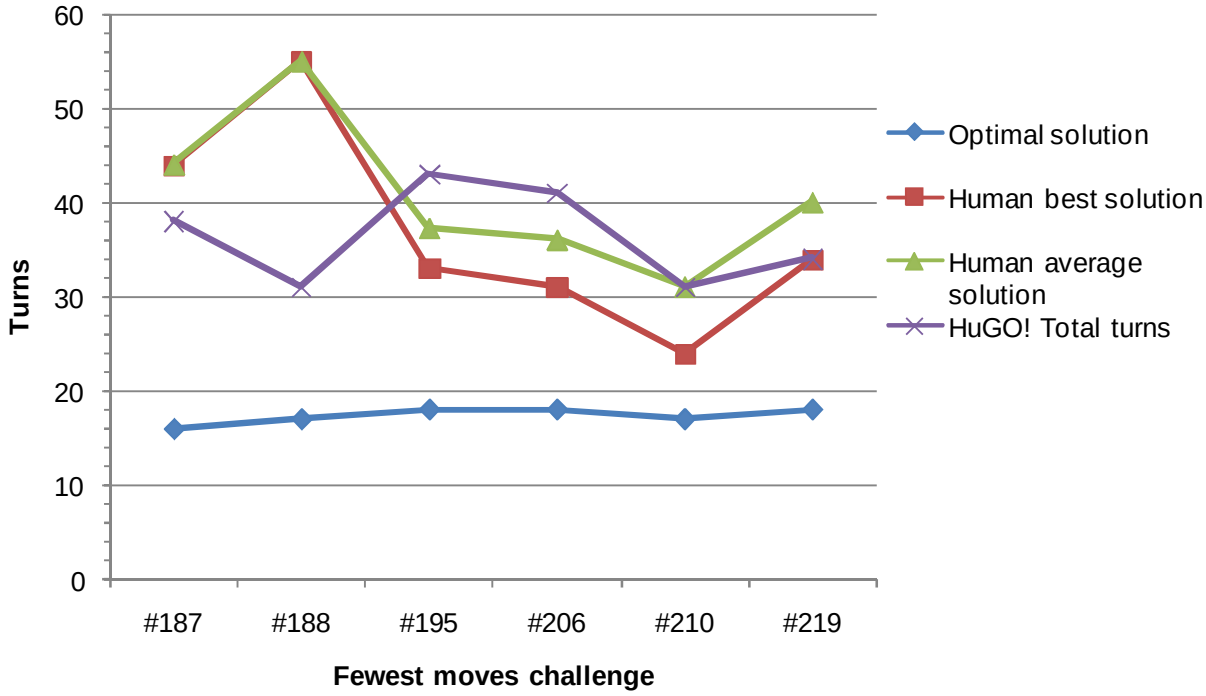


- A: The result would qualify today as a patentable new invention.
- B: The result is better than a result published in a reviewed scientific journal.
- D: The result is publishable in its own right as a new scientific result.
- E: The result is equal to or better than the most recent human-created solution to a long-standing problem for which there has been a succession of increasingly better human-created solutions.

- F: The result is equal to or better than a result that was considered an achievement in its field at the time it was first discovered.
- G: The result solves a problem of indisputable difficulty in its field.
- H: The result holds its own competition involving human contestants.

HUGO competes: Hugo-Human Competition



#187: B F2 D2 L B2 D' L B R2 U' B' F' L B2 L' R B' U2 F B' R D R' D' F' L D' U L'

#188: D L' R D' U R F D2 R L' F2 B2 L' U' F2 D U B U B' L2 F U R U2 L' B2 U F' D'

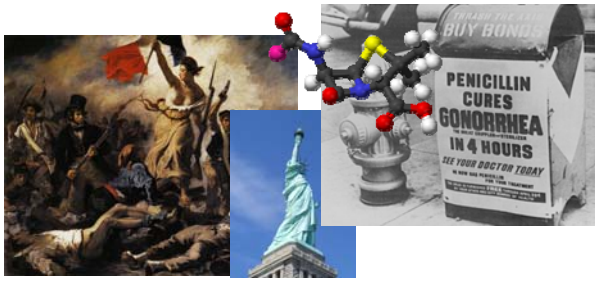
#195: F R' F2 L' D' R' D' R F' L2 R' B2 L2 R' F2 U' D' R' D R F' B2 D B2 F' L2 R2 U' B' D2

#206: D' F2 B' L R' U F U' D2 B R2 L2 D' B2 F R2 L2 D U2 B2 L2 D R D2 U L D R2 U' R'

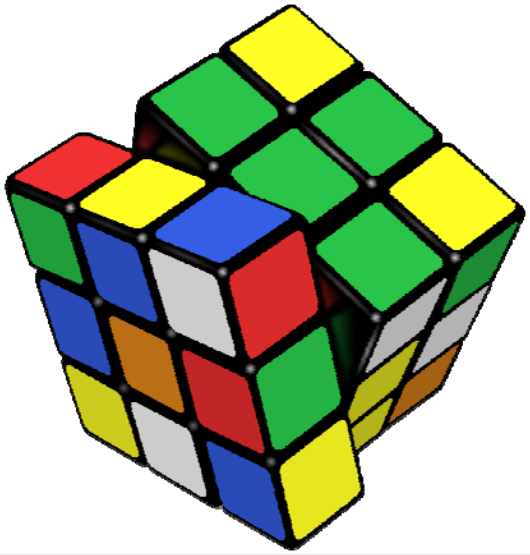
#210: L' F L B' L' B' R' L' D' R L B2 R' D2 F2 R' D2 B R' L D' R2 U B' U' B R L' B2 L'

#219: D' L2 R' F' R B2 R2 F B' R D2 R D B' L' R U2 D L' R2 U D B L' F L2 U D B2 L

- This entry **does not** apply its considerable power to an existential problem, as others might.



- **Nor** does it present a grand social or medical improvement, which would be highly desirable.



- Although – to be fair – it solves a problem that has irked millions of people since the late 1970s!

- This entry does not apply its considerable power to

  an existential problem, as others might.

- Nor do

  improve

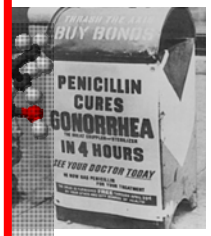
- Althoug

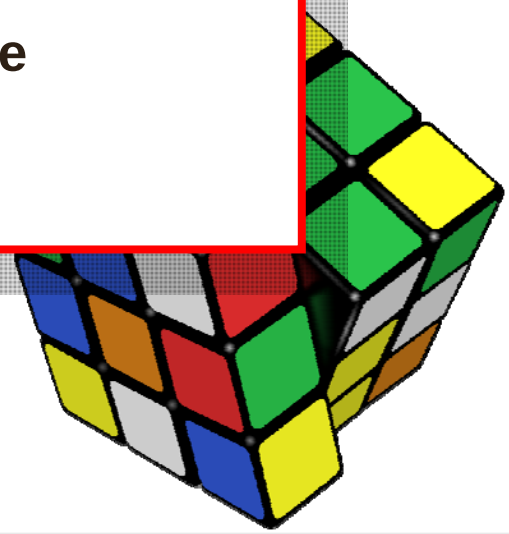
  irked m

In fact, this entry goes further than that, by

1. supplying a solution on a meta-level and

2. building a background for any of those applications!





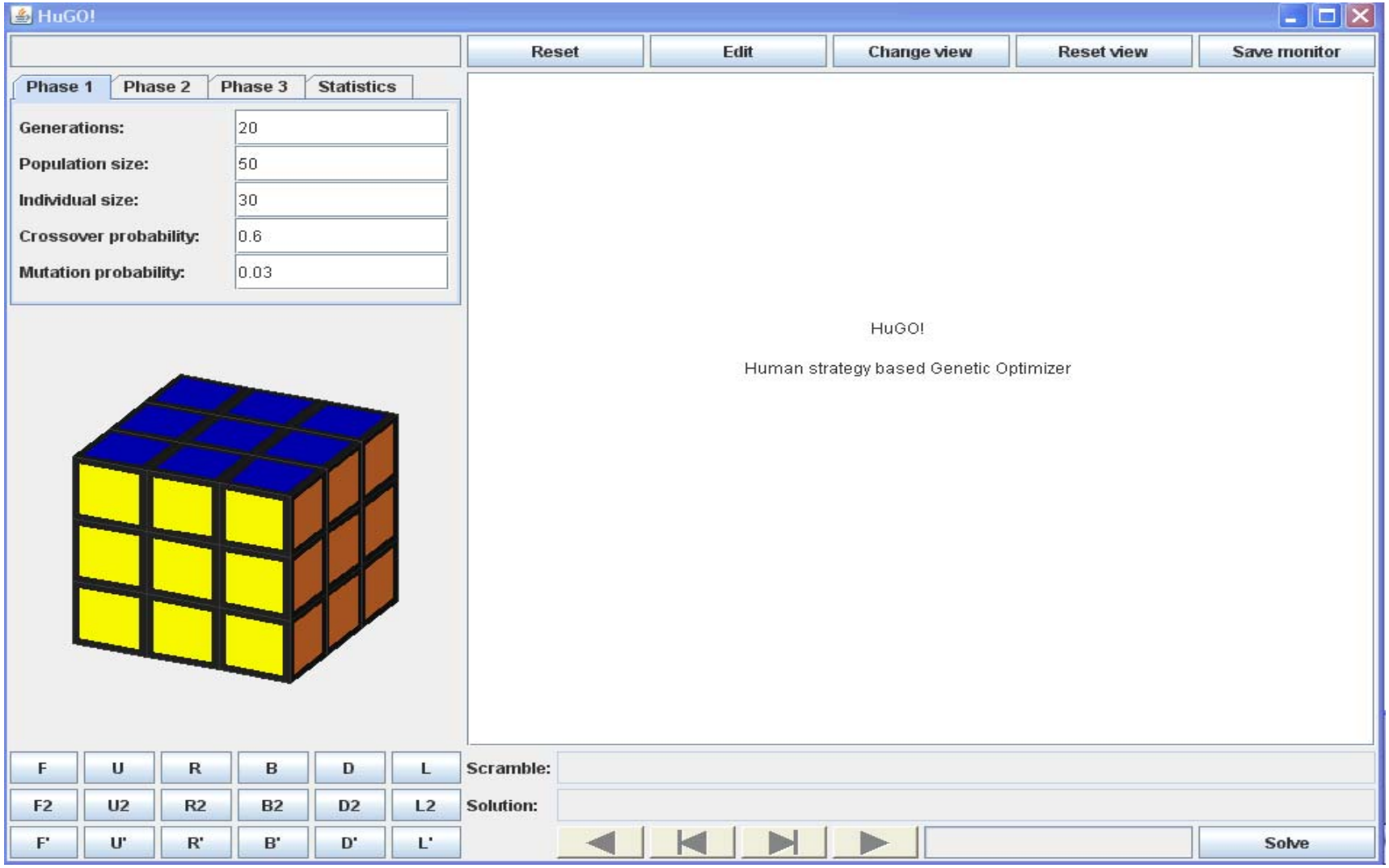
• Since the introduction of the ideas of evolutionary problem solving, the focus of applications has been on either not solvably scaled problem sizes or problems which are not solvable in an analytical way at all.

• Often, incorporating human strategies in real life is quite similar: Examples are decision strategies based on a "rule of thumb" approach and expert knowledge for certain problems which are often in a descriptive form.

- In the work filed for the award, the evolution of such a strategy is considered, which has been proven to be successful in many human competitions.

- Therefore, the approach qualifies for a new research direction within Evolutionary Computation, which is determined and inspired by human achievements.

- This can be considered as one of the major goals of the “HUMIES” AWARDS FOR HUMAN-COMPETITIVE RESULTS.


HuGO!
Reset
Edit
Change view
Reset view
Save monitor
Phase 1
Phase 2
Phase 3
Statistics
Generations:
20
Population size:
50
Individual size:
30
Crossover probability:
0.6
Mutation probability:
0.03
HuGO!
Human strategy based Genetic Optimizer
F
U
R
B
D
L
F2
U2
R2
B2
D2
L2
F'
U'
R'
B'
D'
L'
Scramble:
Solution:
Solve