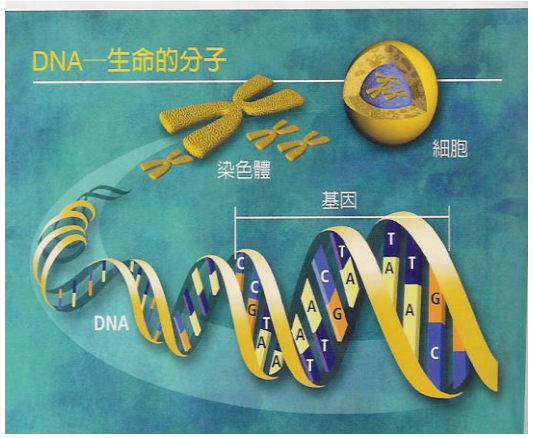

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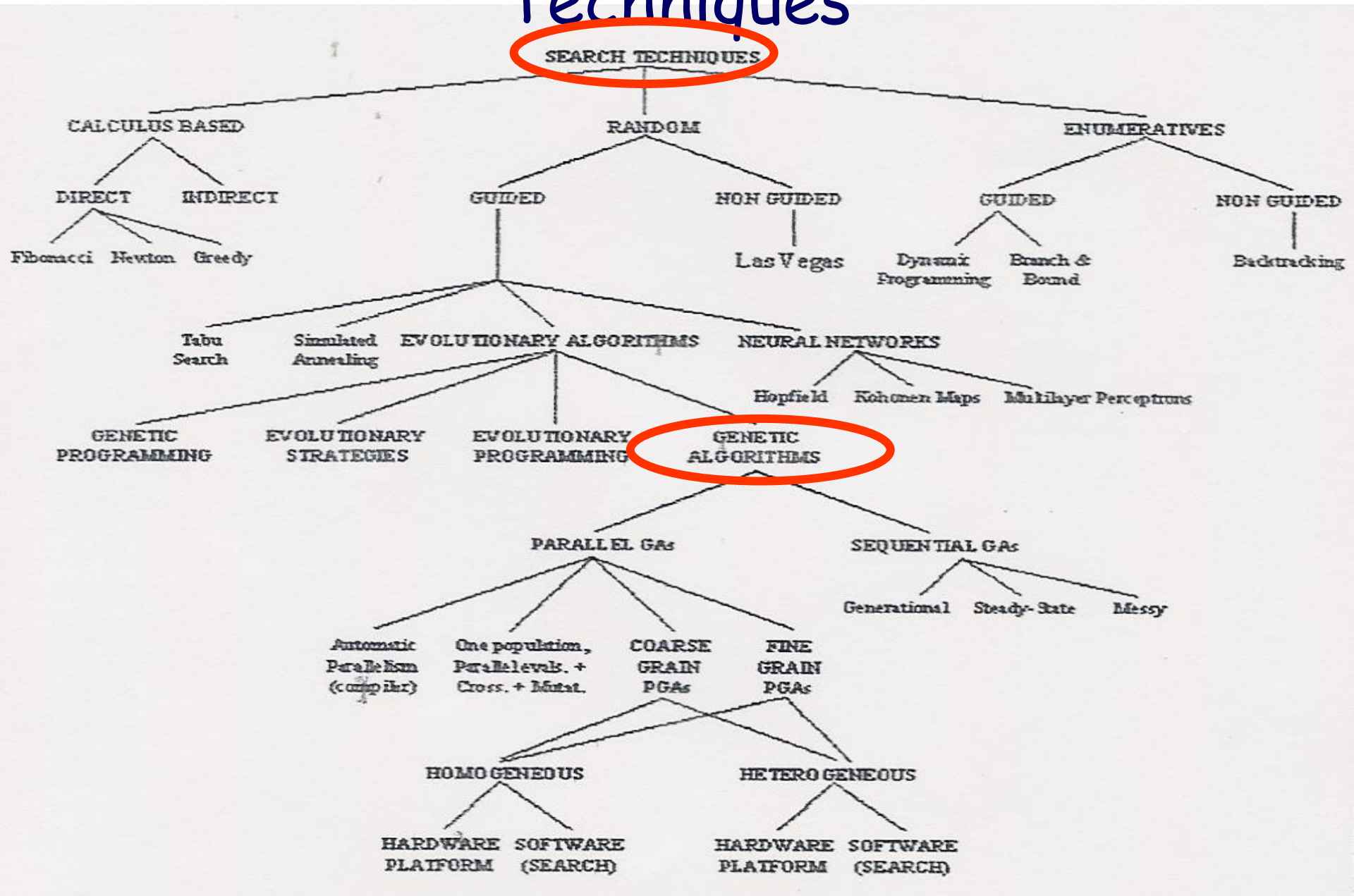
Genetic Algorithms
遺傳基因演繹法

Prof. Shu-Mei Guo (郭淑美教授)

Department of Computer Science and Information Engineering
National Cheng-Kung University

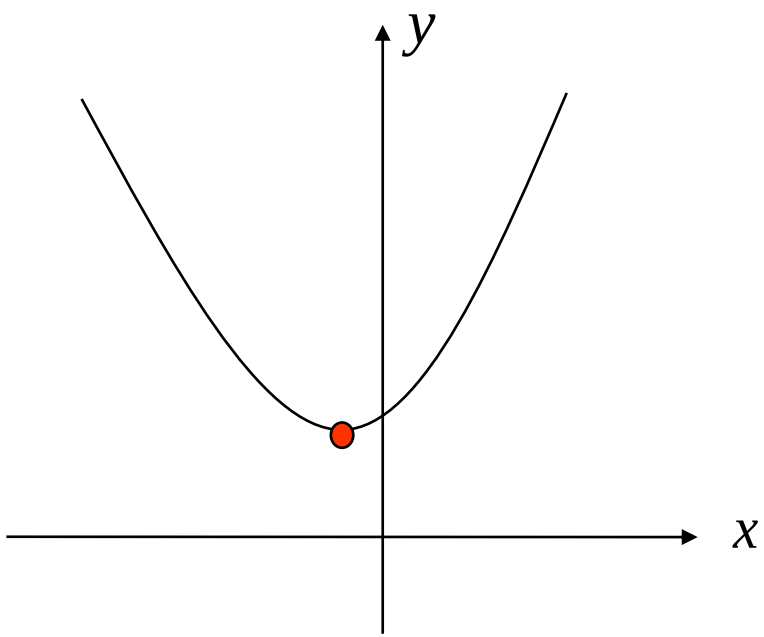
Classification of Search Techniques



Problem

$$\min \; f(x) = x^2 + x + 1$$

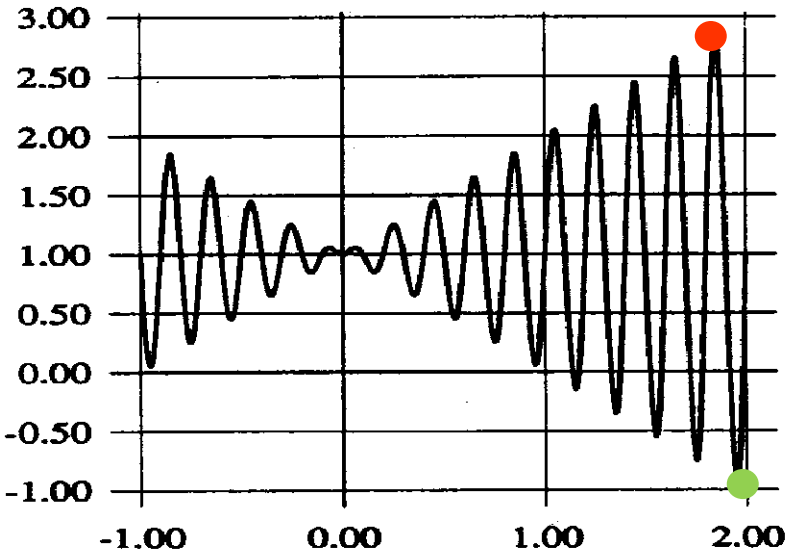
$$x \in [-1..2]$$



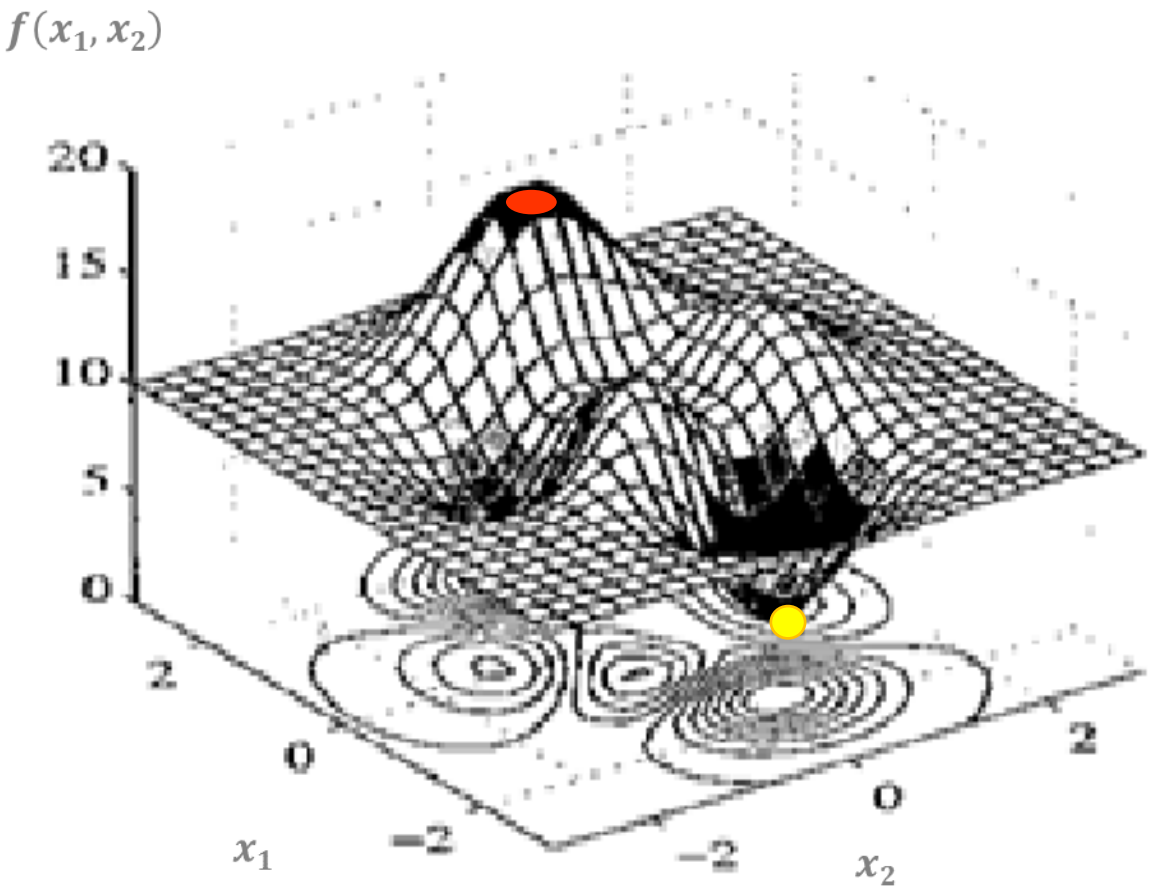
Problem

$$\max f(x) = x \cdot \sin(10\pi \cdot x) + 1$$

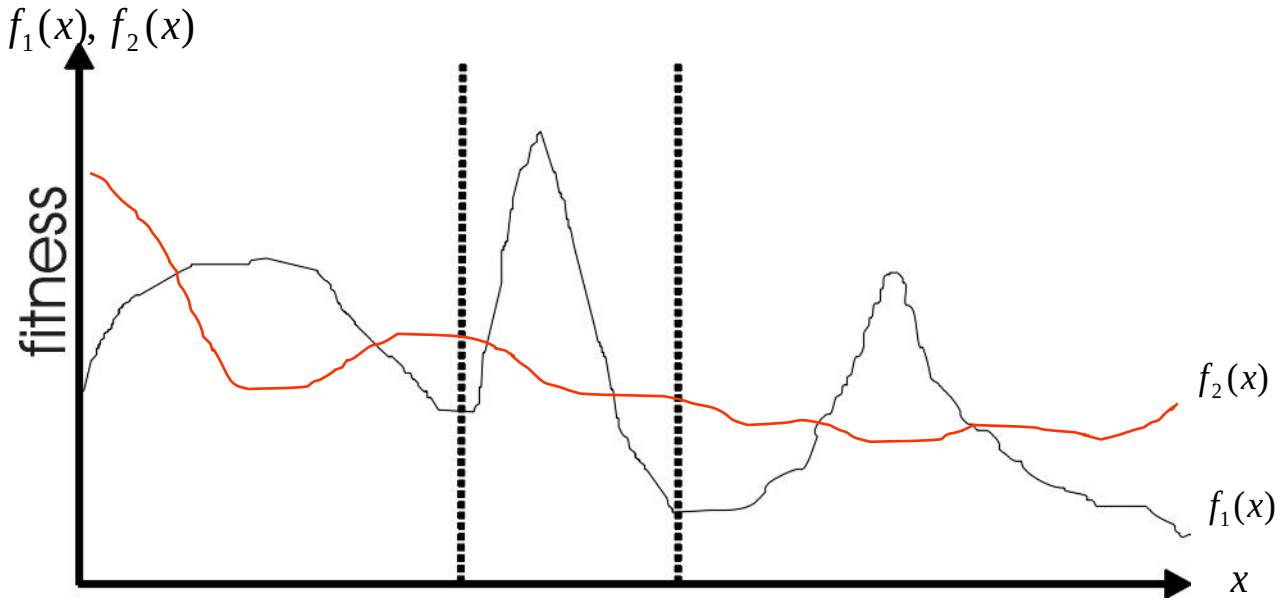
$$x \in [-1..2]$$



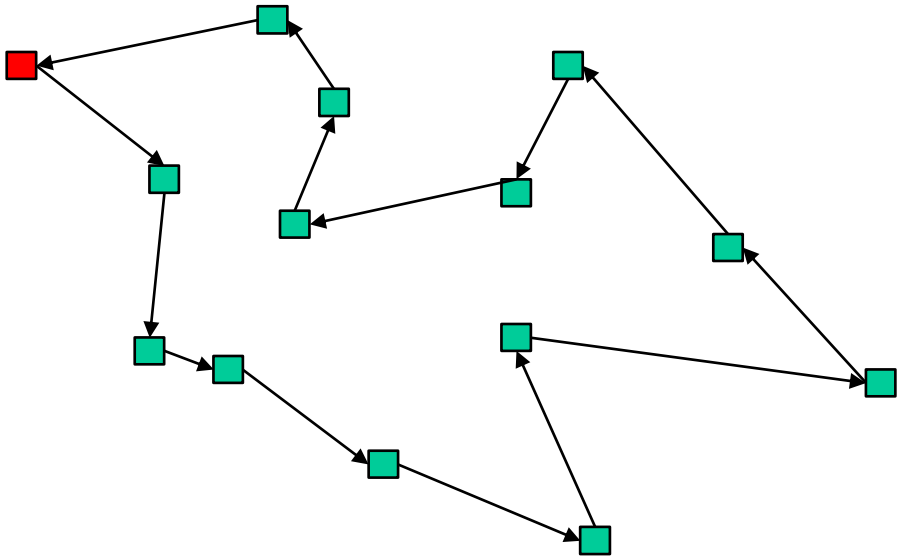
Problem



Problem



Problem



Problem

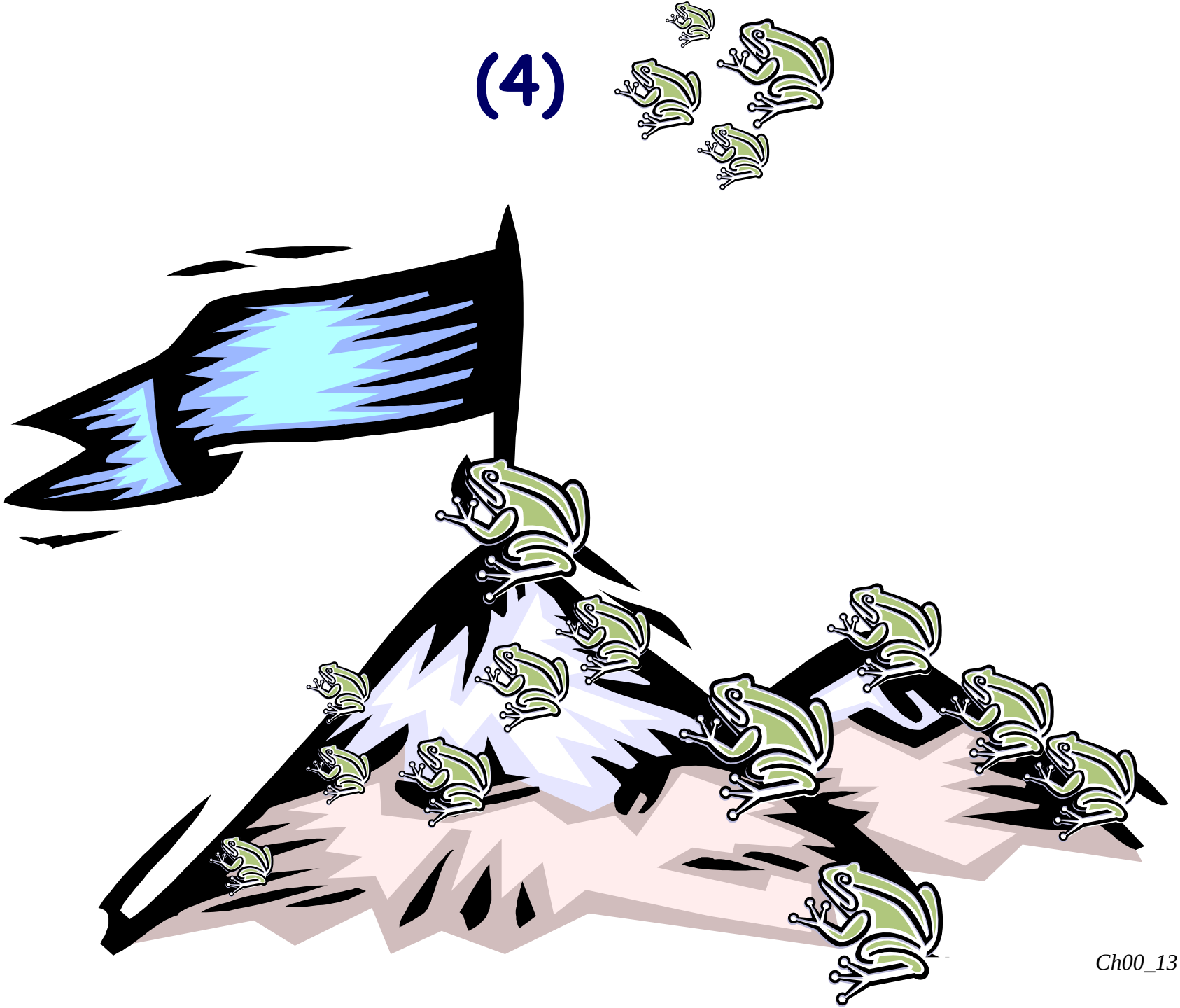
Problem

(1) 

(2)

(3)

(4)

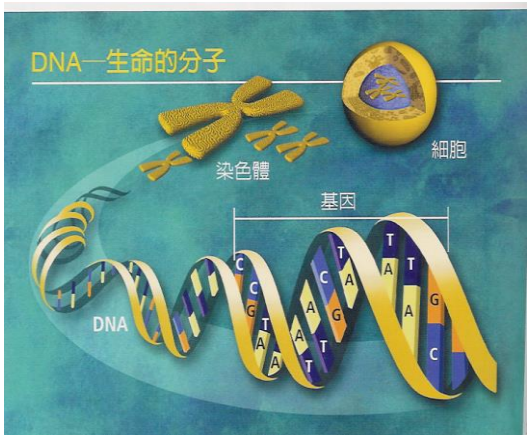


(1) (2)

(3)

(3)

(4)



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Genetic Algorithms

SUMMARY

- is based on biological metaphors
- has great practical potentials
- is getting popular in many fields
- yields powerful, diverse applications
- gives high performance against low costs
- AND IT'S FUN !

- "Enhancing Differential Evolution Utilizing Eigenvector-Based Crossover Operator," *IEEE Transactions on Evolutionary Computation*.(Ranking = 1/133 = 0.7%; IF = 10.629)
- "Improving differential evolution with successful-parent-selecting framework," IEEE Transactions on Evolutionary Computation, (SCI, EI) (Ranking = 1/133 = 0.7%; IF = 10.629).
- "Constraint-activated Differential Evolution for Constrained Min-max Optimization Problems: Theory and Methodology," Expert Systems with Applications. (Ranking = 3/83 = 3.6%; IF = 3.928)
- " Fast large-scale image enlargement method with a novel evaluation approach: benchmark function-based peak signal-to-noise ratio" IET Image Processing. (SCI, EI)
- "Constrained min-max optimization via the improved constraint-activated differential evolution with escape vectors," Expert Systems with Applications, vol. 46, pp. 336-345. (SCI, EI) (Ranking = 3/83 =3.6%; IF = 2.982)
- "Evolutionary fuzzy block-matching based camera raw image denoising," IEEE Transactions on Cybernetics. (Ranking = 5/133 = 3.7%; IF = 8.803)
- ….

Textbook & Grading

- **Textbook:**
  - "*Genetic Algorithms + Data Structures = Evolution Programs*," by Zbigniew Michalewicz, Springer.
- **Grading:**
  - The final grade assigned will be based on the grades:

    1~2 exams + quizzes (30~40%), 3~4 projects + presentations (60~70%).

Zbigniew Michalewicz

Genetic Algorithms + Data Structures = Evolution Programs

Third, Revised and Extended Edition

Springer

Q & A