Mean Field Annealing, Simulated Annealing, and non-Euclidean Combinatorial Optimization Problems: The case of Academic Course Scheduling.

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1 A rough outline of the chapters

1. The first chapter (goto ch. 2 or 3)
    - Introduction
    - Background
    - Motivation
2. The second chapter (goto ch. 4 or 5 or 6)
    - The timetabling problem
    - Type of constraints and data involved
    - Representation of the problem's constraints
3. The third chapter (goto ch. 4 or 5)
    - Heuristics and Methods
        - Mean Field Annealing [MFA] (a neural networks approach)
            * Description of the Method
            * On the Network Topology and Simulation
        - Simulated Annealing [SA]
            * The Algorithm, description of its steps
            * Cooling and adaptive cooling schedules
        - Expert Systems [ES]
        - Graph Coloring heuristics
4. The fourth chapter (goto ch. 5 or 7)
    - More on Simulated Annealing and cooling schedules
    - Handling timetabling constraints on SA
5. The fifth chapter (goto ch. 4 or 7)
    - More on Mean Field Annealing
    - Handling timetabling constraints on MFA
6. The sixth chapter (goto ch. 7)
    - More on graph coloring representation
    - Mapping of timetabling into graph coloring
7. The seventh chapter (goto ch. 1)
    - Simulation results
        - Comparison of figures and plots/graphs

   - What to deduce from such results (or what have we learned so far?)

8. Appendix A
   - Sample code and modules
     - SA modules, ...
     - MFA modules, ...
     - ES modules, ...
     - GC modules, ...
9. Appendix B
   - On the WWW optimization set of tools
   - List of tools
   - How they are related?
   - Others ... ?
10. References

2 A set of educational tools in optimization on the web

- Our current optimization paper using simulated annealing, mean field annealing, and graph coloring heuristics will be converted to an html document... Also, this paper and other two (one addressing various theoretical issues of feedforward neural nets, and the other talks about a biologically inspired alternative algorithm to back-prop) will be made available as SCCS documents.
- A glossary of terms, concepts and a roadmap of pointers and references are to be added to the aforementioned html document. The target is to make it part of the educational roadmaps on *http://www.npac.syr.edu/roadmap/*.
- Pointers to other useful pages and references are to be included.
- Pointers to other optimization methods tackling timetabling or scheduling in general are also to be included.
- When this page becomes available I'll make it accessible from my homepage as well as be part of the aforementioned roadmap.
- Roadmap to physical optimization using heuristics such as genetic algorithms, tabu search, neural nets, and simulated annealing.
- Roadmap to data mining
  1. Methods and heuristics used.
  2. Other ongoing work and literature.