Understand local search through visualization and animation

A way for debugging and tuning local search

The behavior of local search algorithms for solving Combinatorial Optimization Problems (COP) is not well understood. Given that local search is heuristic-based and often stochastic, it is difficult to analyze and runtime experimentation is needed to understand the algorithm behavior.

We present an off-line program visualization tool for analyzing Local Search behavior, called Viz. Viz combines the strengths of both human and computer to answer various local search behavior. Viz can draw local search trajectories in both algorithm and problem independent fashion and is intended to provide a visual tool for the algorithm designers to experiment with the results of local search. Viz also provides the usual algorithm and problem specific visualizations and loads of other important local search analysis tools.

All of these important analysis information can be yours just by logging simple information from your local search runs using Viz log file format!!

For more details and to download Viz, please visit: http://www.comp.nus.edu.sg/~stevenha/viz
Questions about Local Search Behavior:
• Does it behave like as what we intended?
• How good is the local search in intensification?
• How good is the local search in diversification?
• Is there any sign of cycling behavior?
• How does the local search algorithm make progress?
• Where in the search space does the search spend most of its time?
• How far is the starting/initial/greedy solution w.r.t. the global optima/best known solution?
• Does the search quickly find the global optima/best known solution region or does it wander around in other regions?
• How wide is the local search coverage?
• What is the effect of modifying a certain search parameter/component/strategy w.r.t. the search behavior?
• How do two different algorithms compare?

The advantages for understanding local search behavior:
• It gives intuition for addressing the LS Tuning Problem
• We can spot and debug incorrect LS behavior

Viz is geared towards enhancing higher level human reasoning by integrating the search trajectories, objective values, with algorithm and problem specific visuals