Adding new clause (ANC) method for local search

AAAI-96 Proceedings, CHA and IWAMA

Basic Concepts

especially exotic ones

cell

A specific assignment of true (or 1) and false (or 0) to all the variables

covering

a clause A covers a cell C if the truth assignment denoted by C makes A false

OL(C)

The number of overlaps of a cell C is the number of the clauses that cover C

Unified local search

a framework

Algorithm

C := randomly selected cell

until *C* becomes a solution **do**

    if *C* is not a local minima

    then

        do α

    else

        do β

WEIGHT method

weighted local search

basic idea

$$OL(C) = \sum_{A \; covers \; C} w(A)$$

standard approach

In the standard weighted local search, WEIGHT, α = Move-downward and β = Weighting.

ANC method

adding new clauses in local search

neighboring clause

there exists exactly one variable which appears affirmatively in one and negatively in the other

approach

α = Move-downward

β = **for** each clause *A* covering *C*

do *B* := a neighbor of *A*

X := resolution *A* and *B*

add *X* as a new clause

Effect

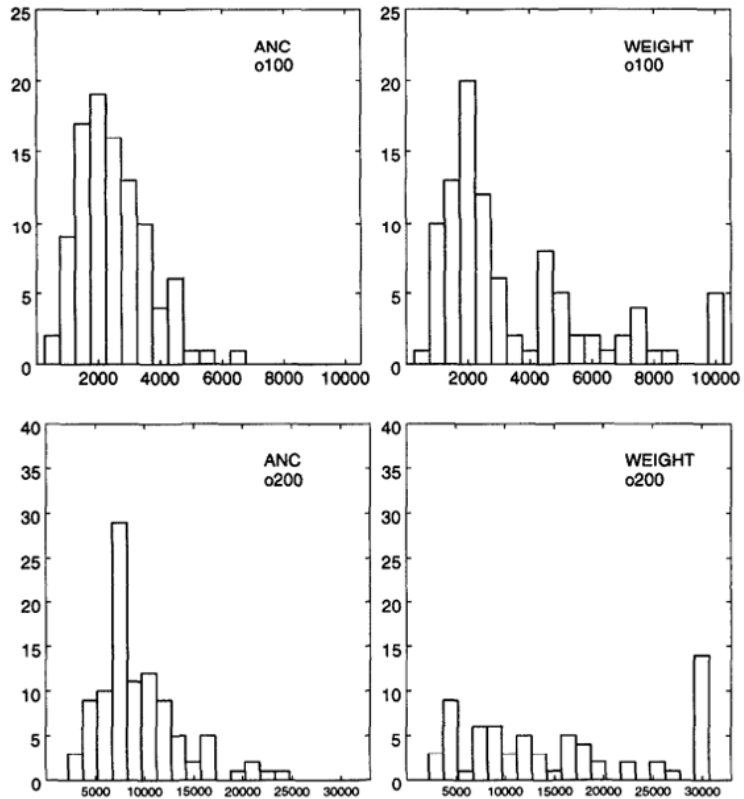


Figure 1: Divergence of the Performance

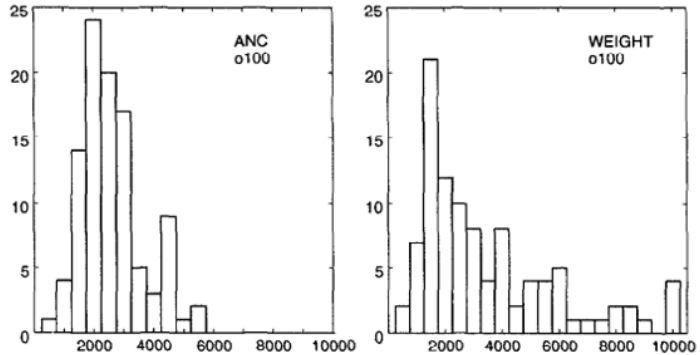


Figure 3: Divergence of the Performance

Analysis

why ANC is better than WEIGHT

assumptions include:

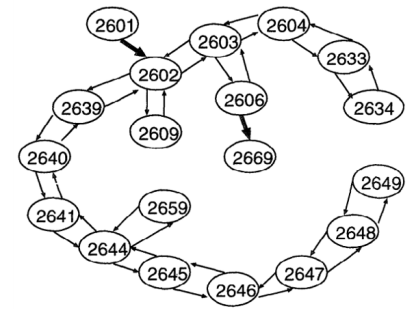
WEIGHT revisits same cells

During 69 steps, only 19 different cells are visited.

feature: easily fall back

ANC has smaller clause sizes

WEIGHT's size is roughly 35, while ANC's is roughly 3



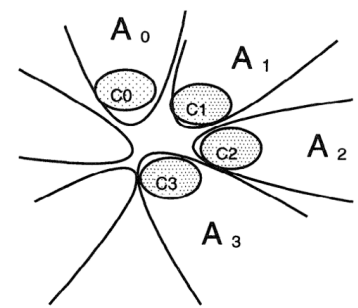


Figure 6: Illustration of the Local Minima and Its Neighbors