§1 TICTACTOE5 INTRO 1

(Downloaded from https://cs.stanford.edu/~knuth/programs.html and typeset on May 28, 2023)

1. Intro. I'm trying to find a nice partitioning of the Boolean functions associated with tictactoe.

For each of the $\binom{18}{6}$ = 18564 choices of six bit coordinates, I compute a score as follows: Count the number of "care" positions that match each setting of the other 12 bits. The score is the sum of squares of those counts.

I minimize the score, in order to spread the cares around rather evenly.

```
#define bitcode v.I
                            /* binary representation of this position */
\#define cases 4520
#include "gb_graph.h"
#include "gb_save.h"
  int care[cases];
  char a[1 \ll 18];
  int count[65];
  main()
     register int j, k, m, x, y, minj;
     register Graph*g = restore_graph("/tmp/tictactoe.gb");
     register Vertex*v;
     for (k = 0, v = g \neg vertices; v < g \neg vertices + g \neg n; v ++)
       if (v \rightarrow arcs) care[k++] = v \rightarrow bitcode;
     if (k \neq cases) {
       fprintf(stderr, "There \ are \ \%d \ cases, \ not \ \%d! \ n", k, cases);
                                /* note Gosper's hack in the following line */
     minj = #7fffffff;
     for (m = {}^{\#}3f; m < 1 \ll 18; x = m \& -m, y = m + x, m = y + (((y \oplus m)/x) \gg 2)) {
       \langle \text{ Compute stats for mask } m \ 2 \rangle;
2. \langle Compute stats for mask m \ _{2} \rangle \equiv
  x = #3ffff - m;
  for (k = 0; k < cases; k++) a[care[k] \& x]++;
  for (k = 1; k \le 64; k++) count[k] = 0;
  for (j = k = 0; k < cases; k++) {
     y = a[care[k] \& x];
     if (y) {
       j += y * y, count[y] ++;
       a[care[k] \& x] = 0;
     }
  if (j \leq minj) {
     minj = j;
     printf("\%05x_{\square}gives_{\square}score_{\square}\%d;_{\square}", m, j);
     for (k = 1; k \le 64; k++) printf("%4d", count[k]);
     printf("\n");
This code is used in section 1.
```

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3. Index.

 $a: \underline{1}.$ arcs: 1. $bitcode: \underline{1}.$ care: $\underline{1}$, $\overline{2}$. cases: $\underline{1}$, $\underline{2}$. $count: \underline{1}, \underline{2}.$ exit: 1.fprintf: 1. $g: \underline{1}$. Graph: $\underline{1}$. $j: \quad \underline{1}.$ $k: \quad \underline{1}.$ $m: \underline{1}.$ $main: \underline{1}.$ $restore_graph$: 1. stderr: 1.v: $\underline{1}$. $Vertex: \underline{1}.$ vertices: 1. $x: \underline{1}.$

y: $\frac{1}{1}$.

TICTACTOE5 NAMES OF THE SECTIONS 3

 \langle Compute stats for mask m _2 \rangle _ Used in section 1.

TICTACTOE5

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