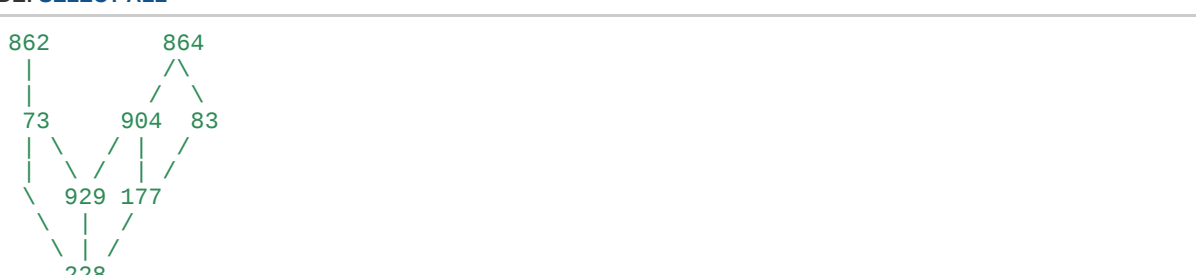


The hardest sudokus (new thread)

Re: The hardest sudokus (new thread)

Running a check now for max-expands that are connected by sub-puzzles; here's the first such case:

CODE: SELECT ALL



```
...4.67.9..6...32.89...5.9184...86.7.9167...4.649.8...1..74...716...[32|862
...4.67...6...2.32.89...5.9184...86.7.9167...4.649.8...1..74...716...[31|73
...4.67.9..6...32.89...5.9184...76..86.7.9167...4.6.9.8...1..74...16...[32|864
...4.67...6...32.89...5.9184...76..86.7.9167...4.6.9.8...1..74...16...[31|83
...4.67.9..6...32.89...5.9184...7...86.7.9167...4.6.9.8...1..74...16...[31|904
...4.67...6...32.89...5.9184...7...86.7.9167...4.6.9.8...1..74...16...[30|177
...4.67.9..6...32.89...5.9184...86.7.9167...4.6.9.8...1..74...16...[30|929
...4.67...6...32.89...5.9184...86.7.9167...4.6.9.8...1..74...16...[29|228
```

Re: The hardest sudokus (new thread)

The largest case is four max-expands; there are four such families, here's the earliest:

CODE: SELECT ALL

```
max-expands:
1.3...78..56789...78...5.....59.67..6..728...7.6.8.2...7...2.86.28.795...92..67[37|1229
1.3...78..56789...78...5.....59.67..6..728.5.7.6.8.2.....2..6.28.795...92..6[35|263207
1.3...8..56789...78.....6...59.67..6..728...7.6.8.2.....6.28.795...92..6..[32|10703
1.3...8..56789...78.....59.67..6..728...7.6.8.2.....6...6.28.795...92..6..[32|10706

min-expand:
1.3...8..56789...78.....59.67..6..728...7.6.8.2.....6.28.795...92..6..[31|16475
```

Re: The hardest sudokus (new thread)

hendrik, to make sure I don't miss anything would you mind compiling a single list of your 11.6+ puzzles since my March 21 post (the-hardest-sudokus-new-thread-t6539-1230.html#p318907)?

The last time I consulted this thread was about a week ago, so I saw your post only just now. After March 21st I posted lists of 11.6+s on April 5th and May 15th. I did not check them against the expanded minlex list you posted on March 21 assuming that your list was a different presentation of previously posted puzzles.

I am ready to put them all together in a single list but the question is how to transfer this long list? Do you have a website where I can upload them, or can I send them by PM to you?

P.S. After reading your more recent posts I want to ask if you still need the list you requested on June 20th?

Re: The hardest sudokus (new thread)

hendrik, let's just do it this way: here's the list I put together: [monh-202206](#)

Re: The hardest sudokus (new thread)

This is not unexpected, but I ran a check anyway:

All known depth 3 puzzles have the properties that...

- Exactly three digits appear at most once each. (Obviously at least two must appear. It's a pretty even split between ...110 and ...111 distributions, slightly more of the latter.)
- Those digits (the ones that appear at all) appear in the same box.

This will make identifying TH patterns simple for the current set: they must occur in the four boxes not seeing that single box, and they must include all cells in those four boxes limited to the three digits with this property. This should allow for a quick script to get the count of guardian cells for all the min-expands. I'll work on that next (possibly two versions - one with the puzzle as is, one with the puzzle after basics, since hidden pairs in the TH boxes are fairly common from what I've seen).

Re: The hardest sudokus (new thread)

Not only Hidden Pairs but any Subset of size ≤ 3. Moreover, in many cases, the pattern appears (or appears in simpler form, with much fewer additional candidates) only after applying many more rules than only Subsets.

Re: The hardest sudokus (new thread)

Hi mith,

One batch of 615 11.6s (my second post of April 5th) are not in the list you compiled. You can find them (a hidden list) here: [the-hardest-sudokus-new-thread-t6539-1230.html#p319648](#)

Re: The hardest sudokus (new thread)

See my first analyses of the collection here: <http://forum.enjaysudoku.com/the-tridagon-rule-t39859-60.html>

Re: The hardest sudokus (new thread)

Hi mith,

One batch of 615 11.6s (my second post of April 5th) are not in the list you compiled. You can find them (a hidden list) here: [the-hardest-sudokus-new-thread-t6539-1230.html#p319648](#)

Thanks hendrik, I will process these before I start my scripts back up, and include the resulting expanded forms in the next batch.

Re: The hardest sudokus (new thread)

Looks like I had already gotten them in April, just missed them this week double-checking.

Re: The hardest sudokus (new thread)

I took the time to have a closer look at the list posted by mith on March 21st. (the-hardest-sudokus-new-thread-t6539-1230.html#p318907)

It reminds me of a list I made in september 2021. I wanted to know if in ph_2010, all puzzles with equivalent solutions were 'closely' related. This list was the result of the analysis of all 11.2+ puzzles in ph_2010. It contains groups of puzzles with equivalent solutions. Only groups with at least two members are listed. The largest group (of puzzles with SER >= 11.2 and equivalent solutions) counted 523 members, all closely related. The first line of each group is the canonical morph of the common (equivalent) solution of all members of the group. column 2: line number in ph_2010 column 3: ID col. 4: first digits of original puzzle col. 5: additional puzzle data (unfortunately, on my screen this column goes to a new line)

This is the top of the list (first 7 groups):

Hidden Text: Show

It appears that in the overwhelming majority of groups, the members are closely related. One of the very rare exceptions is the first member of this group:

Hidden Text: Show

And now something completely different. My script for finding new hard puzzles stopped yesterday when skfr did not return a rating result for this puzzle: ..2.3..4...2.53.15..14.8..987.....6.....85.....4.3.251...58.4.2....14.8. I use this command line (in VBA script) for skfr: res = Wshshell.Run("skfr_win64_v2_0_1.exe", vbHide, True) However, SER returns this result for the same puzzle: ..2.3..4...2.53.15..14.8..987.....6.....85.....4.3.251...58.4.2....14.8. ED=11.0/1.2/1.2

Re: The hardest sudokus (new thread)

I've had this same occasional issue with my skfr. The puzzles it happens for have always been in the 10.9-11.0 rating range. (It doesn't happen in YZF, which I believe also uses some version of skfr for its ratings.)

Also, this reminds me that I need to filter the non-minimals out of the ph database before publishing my update for it. Had a bug early on and a few slipped through. (3269155 here is not minimal, it's just the union of the two related puzzles.)

by 1toOnly » Mon Jun 27, 2022 6:24 pm

hendrik_monard wrote: skfr did not return a rating result for this puzzle: ..2.3..4...2.53.15..14.8..987.....6.....85.....4.3.251...58.4.2....14.8.

You'll need to run the single-threaded version to get additional (debugging) info out of skfr, it fails at this point, rating the puzzle as ED=0.0/0.0/0.5.

CODE: SELECT ALL

| | | | | | | | | | |
|-----|------|-----|-----|-----|------|-------|------|------|---|
| 1 | 4 | 679 | 2 | 5 | 3 | 8 | 679 | 5 | 4 |
| 48 | 679 | 48 | 2 | 679 | 5 | 3 | 48 | 679 | 1 |
| 5 | 3679 | 36 | 1 | 4 | 679 | 8 | 2 | 679 | |
| 9 | 8 | 7 | 46 | 26 | 136 | 126 | 346 | 5 | |
| 6 | 1235 | 135 | 479 | 279 | 1379 | 129 | 34 | 8 | |
| 234 | 123 | 14 | 8 | 5 | 1369 | 12679 | 679 | 3679 | |
| 78 | 4 | 689 | 13 | 679 | 2 | 5 | 1 | 679 | |
| 37 | 136 | 169 | 5 | 8 | 679 | 4 | 3679 | 2 | |
| 237 | 25 | 569 | 679 | 1 | 4 | 679 | 8 | 37 | |

```
1.2.38.54...2.53.15..14.82.987.....56.....8...85.....4.3.251...58.4.2....14.8.
```

skfr does get to the 11.0 step, but falls over when doing additional checking (around lines 3051-60 in puzzle.cpp). Remove the checking, and skfr rates the puzzle as ED=11.0/1.2/1.2. I don't know the code well enough to say if removing the checks will affect other puzzles ratings.

Re: The hardest sudokus (new thread)

The dll version skfr attached in my solver rates it as 11.0/1.2/1.2

Re: The hardest sudokus (new thread)

Two new 11.8 expanded forms since I started my scripts running again:

CODE: SELECT ALL

```
.....1.....2.3..24...5.....567.....42.....5.8.76...8267.....6.52.4.8774..85... ED=11.8/11.8/3.4 non-minimal
.....1.....2.3..24...5.....567.....42.....5.8.76...8276.....64..85...7.52.4.86 ED=11.8/11.8/3.4 non-minimal
```

Two 26c minimals each. When I get the minimal database update going, I'll pull a list of all the minimals from 11.8+ depth 3 puzzles.

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