

The hardest sudokus (new thread)

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Re: The hardest sudokus (new thread)

by dxSudoku » Mon Aug 30, 2021 12:47 am

I have another question if someone is willing to answer it. If you have 22 givens in your constellations of givens, and given that there are 81 cells, how many unique patterns of constellations are there with 81 givens. Is this simply 81 choose 22 combinatorics? 2 meaning either the given is present in the constellation of givens or the cells is empty. I'm just okay at math so I'm not that confident in my thinking.

QUOTE

dxSudoku

Posts: 43
Joined: 06 April 2020

Re: The hardest sudokus (new thread)

by marek stefanik » Mon Aug 30, 2021 7:43 am

There is no (known) sudoku that would require brute-force as a solving step – otherwise you couldn't get a meaningful rating function. Most rating systems add another layer of chains to solve the hardest puzzles. Only puzzles with exactly one solution are considered valid – this is checked for before attempting to rate the puzzle and it is indeed done by brute-force. For more insight into the creation process, check out [this post](#) by mith.

QUOTE

marek stefanik

Posts: 269
Joined: 05 May 2021

dxSudoku wrote:
If you have 22 givens in your constellations of givens, and given that there are 81 cells (...) either the given is present in the constellation of givens or the cells is empty.

You have 81 choose 22 ways to organise them, some of which cannot produce a unique solution when filled with digits (such as all givens in one band).

Re: The hardest sudokus (new thread)

by mith » Wed Sep 01, 2021 2:48 pm

CODE: SELECT ALL
31c
.....1.....2.3...34..5.....1.6..736.34.781.78....6....8...1.631..86.4.4.67...8. ED=11.6/1.2/1.2

This one isn't too surprising since we were already in +dfc range, but finally found one.

QUOTE

mith

Posts: 862
Joined: 14 July 2020

Re: The hardest sudokus (new thread)

by mith » Wed Sep 01, 2021 2:52 pm

CODE: SELECT ALL
36c
.....1...2.34..2.1356..17.86..3.6.2.1.8.2.873.6...7..28...12.36..7.8.61.73... ED=10.6/1.2/1.2

(A few 35c as well.)

QUOTE

mith

Posts: 862
Joined: 14 July 2020

Re: The hardest sudokus (new thread)

by urhegyi » Fri Sep 03, 2021 2:43 pm

What is the highest sudoku rating ever? I thought it was below the theoretical 12.0. But now i'm confused. I just rated a sudoku-x (with diagonal blocks) for over 18,5 hours and this was the result:

Hidden Text: Show

re-rated in 1.5 hours with the newest version:

Hidden Text: Show

Last edited by urhegyi on Mon Sep 13, 2021 7:05 pm, edited 1 time in total.

QUOTE

urhegyi

Posts: 616
Joined: 13 April 2020

Re: The hardest sudokus (new thread)

by mith » Fri Sep 03, 2021 3:10 pm

11.9 is the high for classic. With additional constraints, you can go higher (anti-knight is another with a puzzle known to be at least 12.6 but probably higher).

QUOTE

mith

Posts: 862
Joined: 14 July 2020

Re: The hardest sudokus (new thread)

by 999_Springs » Fri Sep 03, 2021 4:15 pm

eleven wrote:
heetbeet wrote:
<https://www.dcc.fc.up.pt/~acm/sudoku.pdf>
It's really impressing, that about 10 years after people in this forum posted free programs, which solve each known puzzle (100 times harder than the author's ones) in a split second, a paper is written where it says "No puzzle requiring more than 3 minutes (in a relatively old computer) was found."

just saw this. this is hilarious. i checked it out and solved their "most difficult puzzle" by hand in 12.5 minutes using only hidden pairs and locked candidates. a speed solver on here like strmckr or quyanzhe or maybe scit might be able to beat the computer's best time - and by the standards of that paper that would mean humans are better than computers at sudoku 🤔

heetbeet seems to also be interested in some sudoku variants like killer sudokus:

heetbeet wrote:
We also used a ton of Killer Sudokus, Calcudoku, Kakuros and Fill-a-Pix for further colouring in our puzzle database.

i would also be interested in what happens with those; there is no widely accepted means of defining difficulty of a killer sudoku other than time to brute force, or number of guesses needed. unlike normal sudokus which solve with brute force in microseconds, the puzzles in [this thread](#) need a few minutes to solve with brute force 🤔 and unlike this author's example these killer puzzles seem to be impossible for humans too

QUOTE

999_Springs

Posts: 585
Joined: 27 January 2007
Location: In the toilet, flushing down springs, one by one.

Re: The hardest sudokus (new thread)

by RSW » Fri Sep 03, 2021 8:30 pm

999_Springs wrote:
just saw this. this is hilarious. i checked it out and solved their "most difficult puzzle" by hand in 12.5 minutes using only hidden pairs and locked candidates. a speed solver on here like strmckr or quyanzhe or maybe scit might be able to beat the computer's best time - and by the standards of that paper that would mean humans are better than computers at sudoku 🤔

Just tried it on my solver, which I'm sure is nowhere near as efficient as the solvers written by other forum members. My solver took 110 milliseconds using basics only.

Solution:

Hidden Text: Show

BTW, I would argue that the term "brute force" has been used rather inaccurately in this discussion. In a puzzle that has been solved using logical moves until an impasse is reached, and then the solver has no remaining strategies except to make a guess, this is not a brute force move. It is a trial and error move, or T&E. To me, brute force refers to a solving technique which never involves any of the recognized Sudoku logic based moves, but rather makes nothing but guesses from the very first move. Brute force is a subset of T&E. Maybe I'm splitting hairs, because experienced human players are generally against any sort of T&E move, brute force or not.

QUOTE

RSW

Posts: 296
Joined: 01 December 2018
Location: Western Canada

Re: The hardest sudokus (new thread)

by m_b_metcalf » Fri Sep 10, 2021 9:24 am

urhegyi wrote:
What is the highest sudoku rating ever? I thought it was below the theoretical 12.0. But now i'm confused. I just rated a sudoku-x (with diagonal blocks) for over 18,5 hours and this was the result:

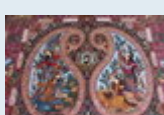
Re: The hardest sudokus (new thread)

by mith » Sat Sep 11, 2021 8:40 pm

CODE: SELECT ALL
33c
.....1...23....24.....5.67..4.8.3.2.86...84..7.6.3.76.38...28.74.3.64.3..2.7. ED=11.3/1.2/1.2

(Also some new 11.7s in the 22-23c range, and a ton of 11.6s in the 27-30c range. I'll post a more complete update once I get through the current good neighborhood.)

QUOTE



m_b_metcalf
2017 Supporter
Posts: 13227
Joined: 15 May 2006
Location: Berlin

QUOTE

mith

Posts: 862
Joined: 14 July 2020

Re: The hardest sudokus (new thread)

by 999_Springs » Sun Sep 12, 2021 11:19 am

here is an old-fashioned ascii histogram of chain lengths of the 11.8 and 11.9 puzzles in 11to9only's [post](#) (by the way, thanks for doing this!)

CODE: SELECT ALL
node count rounded down to nearest 16
SE nodes | sudokus

11.8 256 | #####
272 | #####
288 | #####
384 | #####
320 | #####
336 | ###
352 | ##
368 | # Mike's 20

11.9 384 | #####
400 |
416 | # Golden Nugget
432 | # eleven's Patience
448 |
464 | ## champagne dry; Obi-Wahn 2015
480 |
496
12.0 512 |

from this we can see that:

- 5 of the 9 11.9's only barely make it into the 11.9 category, with a longest chain of less than 400 nodes, putting them into the lowest 1/8th of possible longest chain lengths for 11.9's (384 is the threshold)
- no puzzle exists in the top 1/4 of possible longest chain lengths for 11.9's
- the closest puzzle to SE 12.0 is Obi-Wahn's 11.9, which is the most recently found 11.9, found in 2015
- 81% of 11.8's are in the lower half of possible longest chain lengths for 11.8's
- Mike's 20 clue is the 11.8 that is closest to 11.9

mith wrote:
CODE: SELECT ALL
33c
.....1...23....24.....5.67..4.8.3.2.86...84..7.6.3.76.38...28.74.3.64.3..2.7. ED=11.3/1.2/1.2

this starts with 4 hidden singles so when you fill them in you break Mauricio's 14 year old record from January 2007 for the hardest puzzle with 37 clues, which was his symmetric 11.2. nice!

RSW wrote:
BTW, I would argue that the term "brute force" has been used rather inaccurately in this discussion.

i referred to "brute force" only in the context of solving killer sudokus, and called it that because that was what the solvers called it in the thread that i linked. i don't have those killer sudoku solvers installed but my understanding is that what they describe as "brute force" agrees with what you are saying, in other words, nested guesses using DFS or something similar to determine puzzle validity as quickly as possible. in this context, the killer sudokus in that thread take a few minutes to determine that the solution is unique. [here](#) is an example of a browser based brute force killer sudoku solver which is the fastest one i know of

Re: The hardest sudokus (new thread)

by mith » Sun Sep 12, 2021 4:51 pm

999_Springs wrote:
mith wrote:
CODE: SELECT ALL
33c
.....1...23....24.....5.67..4.8.3.2.86...84..7.6.3.76.38...28.74.3.64.3..2.7. ED=11.3/1.2/1.2

this starts with 4 hidden singles so when you fill them in you break Mauricio's 14 year old record from January 2007 for the hardest puzzle with 37 clues, which was his symmetric 11.2. nice!

Yeah, I need to run my singles expander on all these hard puzzles, I've probably broken some more of the most-clues-for-given-ER by now.

Re: The hardest sudokus (new thread)

by RSW » Sun Sep 12, 2021 4:57 pm

999_Springs wrote:
RSW wrote:
BTW, I would argue that the term "brute force" has been used rather inaccurately in this discussion.

i referred to "brute force" only in the context of solving killer sudokus, and called it that because that was what the solvers called it in the thread that i linked. i don't have those killer sudoku solvers installed but my understanding is that what they describe as "brute force" agrees with what you are saying, in other words, nested guesses using DFS or something similar to determine puzzle validity as quickly as possible. in this context, the killer sudokus in that thread take a few minutes to determine that the solution is unique. [here](#) is an example of a browser based brute force killer sudoku solver which is the fastest one i know of

Actually, I was referring mainly to dxSudoku's use of the term in both this thread and another recent thread. But, as I said, I'm probably splitting hairs.

Re: The hardest sudokus (new thread)

by hendrik_monard » Mon Sep 13, 2021 3:17 pm

mith wrote:
11.9 is the high for classic. With additional constraints, you can go higher (anti-knight is another with a puzzle known to be at least 12.6 but probably higher).

The sudoku in the hidden image of the post by urhegyi » Fri Sep 03, 2021 3:43 pm ,with rating 12.6 is the following:

...1...2...23...44.....5.3...6.1.....5.6.....78.....9....7...1.9.

This sudoku has multiple solutions (at least 5000). Isn't it amazing that Sudoku Explainer 1.2.1 tells that "this sudoku can be solved using the following logical methods..." I would expect that in the case of a sudoku with multiple solutions, no solution can be found with logical reasoning. Or am I missing something?

QUOTE

RSW

Posts: 296
Joined: 01 December 2018
Location: Western Canada

QUOTE



m_b_metcalf
2017 Supporter
Posts: 13227
Joined: 15 May 2006
Location: Berlin

Please scroll back to my previous post about this X-sudoku. M.

[Edit: treated as a standard puzzle, it has 3194507 solutions.]

Last edited by m_b_metcalf on Tue Sep 14, 2021 7:02 am, edited 1 time in total.

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