

**Hazard**

**Rule 451  
Neighbours**

**Increase 10x chances to win at Loto  
6/49**

# Loto, winning probabilities

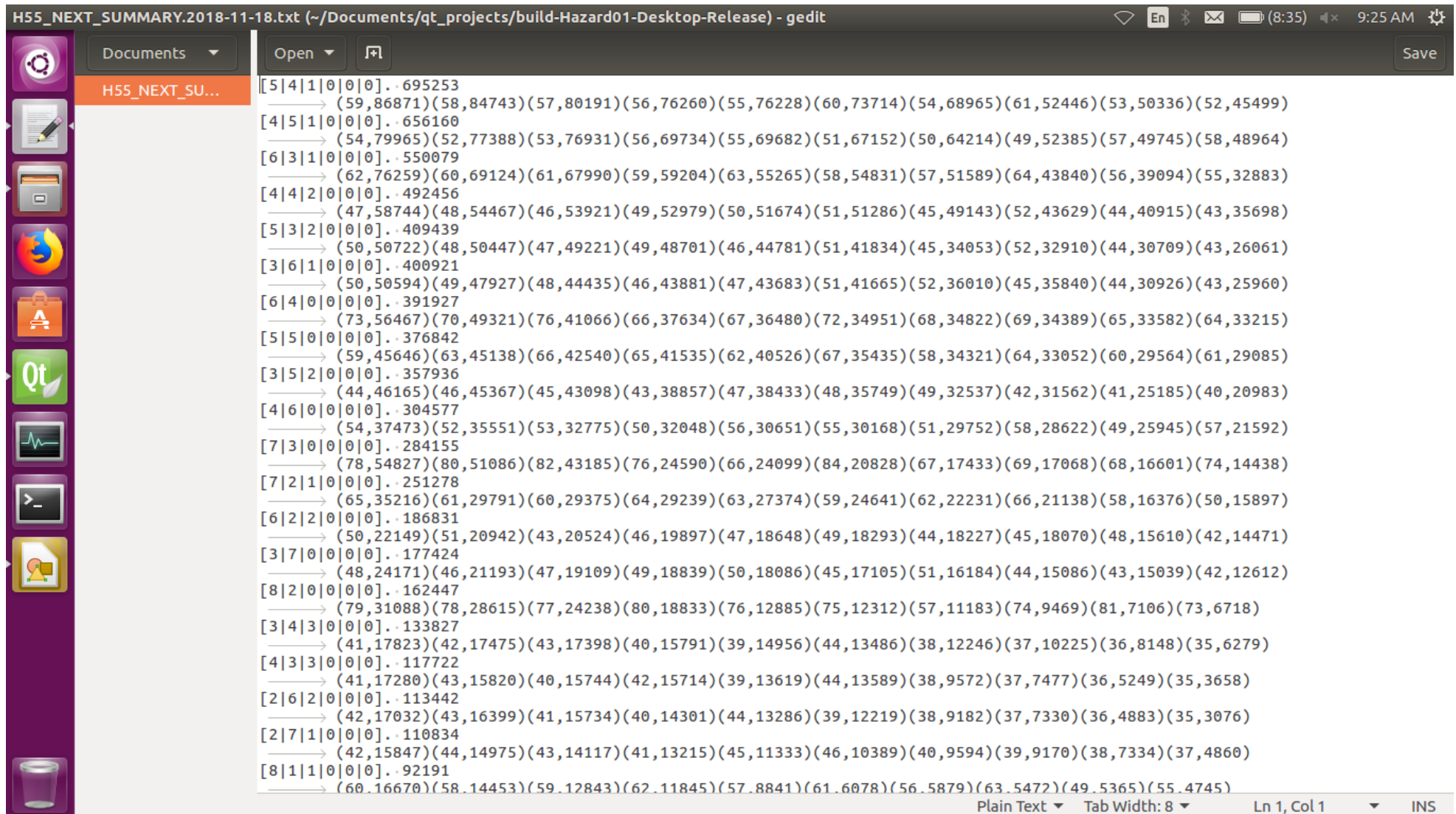
Score	Calculation	Exact Probability	Approximate Decimal Probability	Approximate 1/Probability
0	$\frac{\binom{6}{0} \binom{43}{6}}{\binom{49}{6}}$	435,461/998,844	0.436	2.2938
1	$\frac{\binom{6}{1} \binom{43}{5}}{\binom{49}{6}}$	68,757/166,474	0.413	2.4212
2	$\frac{\binom{6}{2} \binom{43}{4}}{\binom{49}{6}}$	44,075/332,948	0.132	7.5541
3	$\frac{\binom{6}{3} \binom{43}{3}}{\binom{49}{6}}$	8,815/499,422	0.0177	56.66
4	$\frac{\binom{6}{4} \binom{43}{2}}{\binom{49}{6}}$	645/665,896	0.000969	1,032.4
5	$\frac{\binom{6}{5} \binom{43}{1}}{\binom{49}{6}}$	43/2,330,636	0.0000184	54,200.8
6	$\frac{\binom{6}{6} \binom{43}{0}}{\binom{49}{6}}$	1/13,983,816	0.0000000715	13,983,816

# Histogram on lasts 10

	1,2,3,4,5,6
11,12,13,14,15,16	
21,22,23,24,25,26	
31,32,33,34,35,36	
41,42,43,44,45,46	
1,12,13,14,15,16	1
11,2,13,14,15,16	2
11,12,3,14,15,16	3
11,12,13,4,15,16	4
11,12,13,14,5,16	5
1,2,13,14,15,16	1,2

[0,1,2,3,4,5] [4,5,1,0,0,0]
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# Rule 451, all options-1

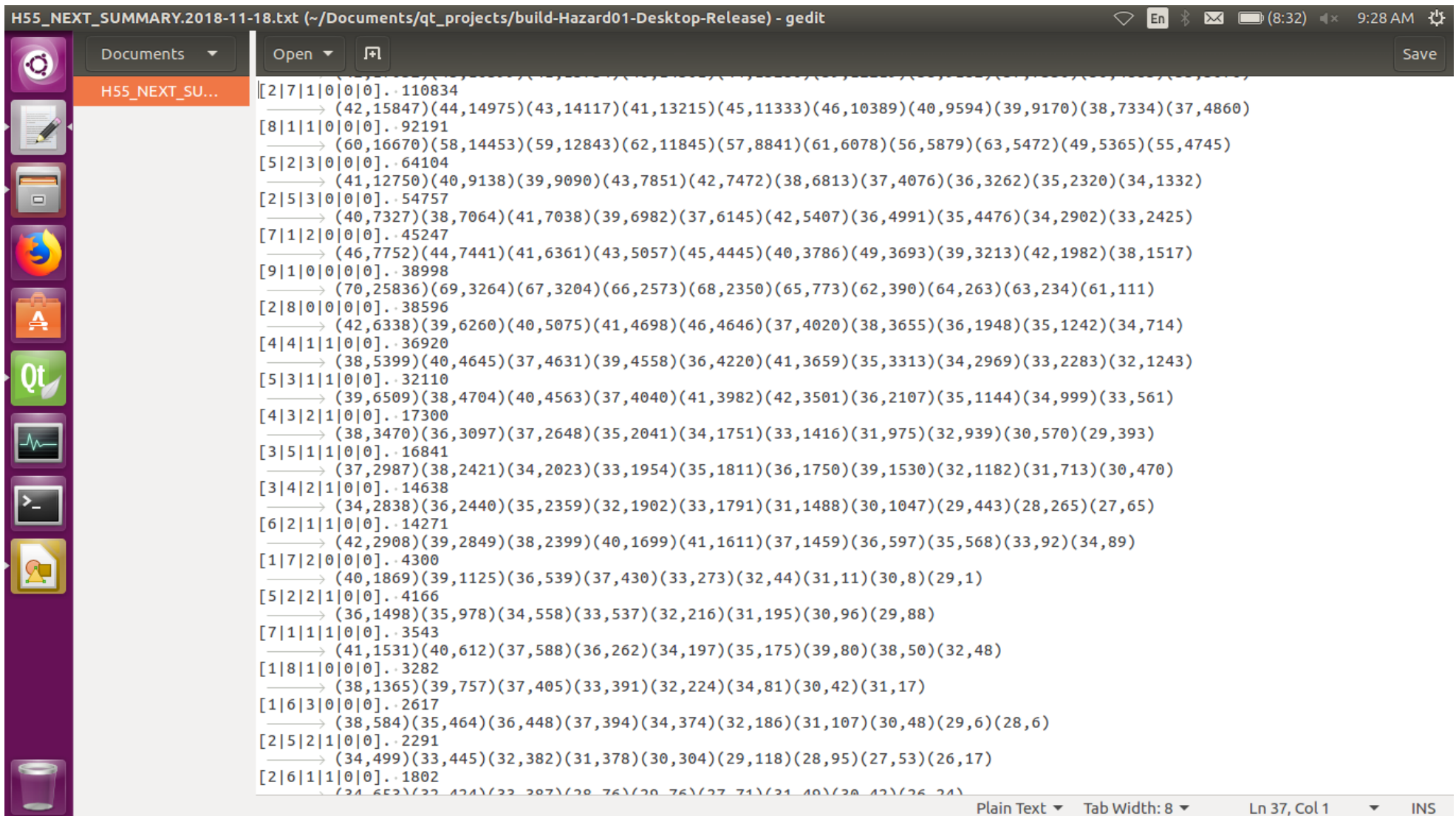


The screenshot shows a Gedit text editor window with the title bar "H55\_NEXT\_SUMMARY.2018-11-18.txt (~/.Documents/qt\_projects/build-Hazard01-Desktop-Release) - gedit". The window has a sidebar on the left with icons for various applications, including a terminal, file manager, and web browser. The main text area displays a list of numbers in a specific format, each preceded by a bracketed identifier. The numbers are arranged in a grid-like pattern, with each row containing a bracketed identifier followed by a list of numbers in parentheses. The numbers are separated by commas and spaces. The list of numbers is as follows:

```
[5|4|1|0|0|0]. 695253
→ (59,86871)(58,84743)(57,80191)(56,76260)(55,76228)(60,73714)(54,68965)(61,52446)(53,50336)(52,45499)
[4|5|1|0|0|0]. 656160
→ (54,79965)(52,77388)(53,76931)(56,69734)(55,69682)(51,67152)(50,64214)(49,52385)(57,49745)(58,48964)
[6|3|1|0|0|0]. 550079
→ (62,76259)(60,69124)(61,67990)(59,59204)(63,55265)(58,54831)(57,51589)(64,43840)(56,39094)(55,32883)
[4|4|2|0|0|0]. 492456
→ (47,58744)(48,54467)(46,53921)(49,52979)(50,51674)(51,51286)(45,49143)(52,43629)(44,40915)(43,35698)
[5|3|2|0|0|0]. 409439
→ (50,50722)(48,50447)(47,49221)(49,48701)(46,44781)(51,41834)(45,34053)(52,32910)(44,30709)(43,26061)
[3|6|1|0|0|0]. 400921
→ (50,50594)(49,47927)(48,44435)(46,43881)(47,43683)(51,41665)(52,36010)(45,35840)(44,30926)(43,25960)
[6|4|0|0|0|0]. 391927
→ (73,56467)(70,49321)(76,41066)(66,37634)(67,36480)(72,34951)(68,34822)(69,34389)(65,33582)(64,33215)
[5|5|0|0|0|0]. 376842
→ (59,45646)(63,45138)(66,42540)(65,41535)(62,40526)(67,35435)(58,34321)(64,33052)(60,29564)(61,29085)
[3|5|2|0|0|0]. 357936
→ (44,46165)(46,45367)(45,43098)(43,38857)(47,38433)(48,35749)(49,32537)(42,31562)(41,25185)(40,20983)
[4|6|0|0|0|0]. 304577
→ (54,37473)(52,35551)(53,32775)(50,32048)(56,30651)(55,30168)(51,29752)(58,28622)(49,25945)(57,21592)
[7|3|0|0|0|0]. 284155
→ (78,54827)(80,51086)(82,43185)(76,24590)(66,24099)(84,20828)(67,17433)(69,17068)(68,16601)(74,14438)
[7|2|1|0|0|0]. 251278
→ (65,35216)(61,29791)(60,29375)(64,29239)(63,27374)(59,24641)(62,22231)(66,21138)(58,16376)(50,15897)
[6|2|2|0|0|0]. 186831
→ (50,22149)(51,20942)(43,20524)(46,19897)(47,18648)(49,18293)(44,18227)(45,18070)(48,15610)(42,14471)
[3|7|0|0|0|0]. 177424
→ (48,24171)(46,21193)(47,19109)(49,18839)(50,18086)(45,17105)(51,16184)(44,15086)(43,15039)(42,12612)
[8|2|0|0|0|0]. 162447
→ (79,31088)(78,28615)(77,24238)(80,18833)(76,12885)(75,12312)(57,11183)(74,9469)(81,7106)(73,6718)
[3|4|3|0|0|0]. 133827
→ (41,17823)(42,17475)(43,17398)(40,15791)(39,14956)(44,13486)(38,12246)(37,10225)(36,8148)(35,6279)
[4|3|3|0|0|0]. 117722
→ (41,17280)(43,15820)(40,15744)(42,15714)(39,13619)(44,13589)(38,9572)(37,7477)(36,5249)(35,3658)
[2|6|2|0|0|0]. 113442
→ (42,17032)(43,16399)(41,15734)(40,14301)(44,13286)(39,12219)(38,9182)(37,7330)(36,4883)(35,3076)
[2|7|1|0|0|0]. 110834
→ (42,15847)(44,14975)(43,14117)(41,13215)(45,11333)(46,10389)(40,9594)(39,9170)(38,7334)(37,4860)
[8|1|1|0|0|0]. 92191
→ (60,16670)(58,14453)(59,12843)(62,11845)(57,8841)(61,6078)(56,5879)(63,5472)(49,5365)(55,4745)
```

The status bar at the bottom of the window shows "Plain Text", "Tab Width: 8", "Ln 1, Col 1", and "INS".

# Rule 451, all options-2

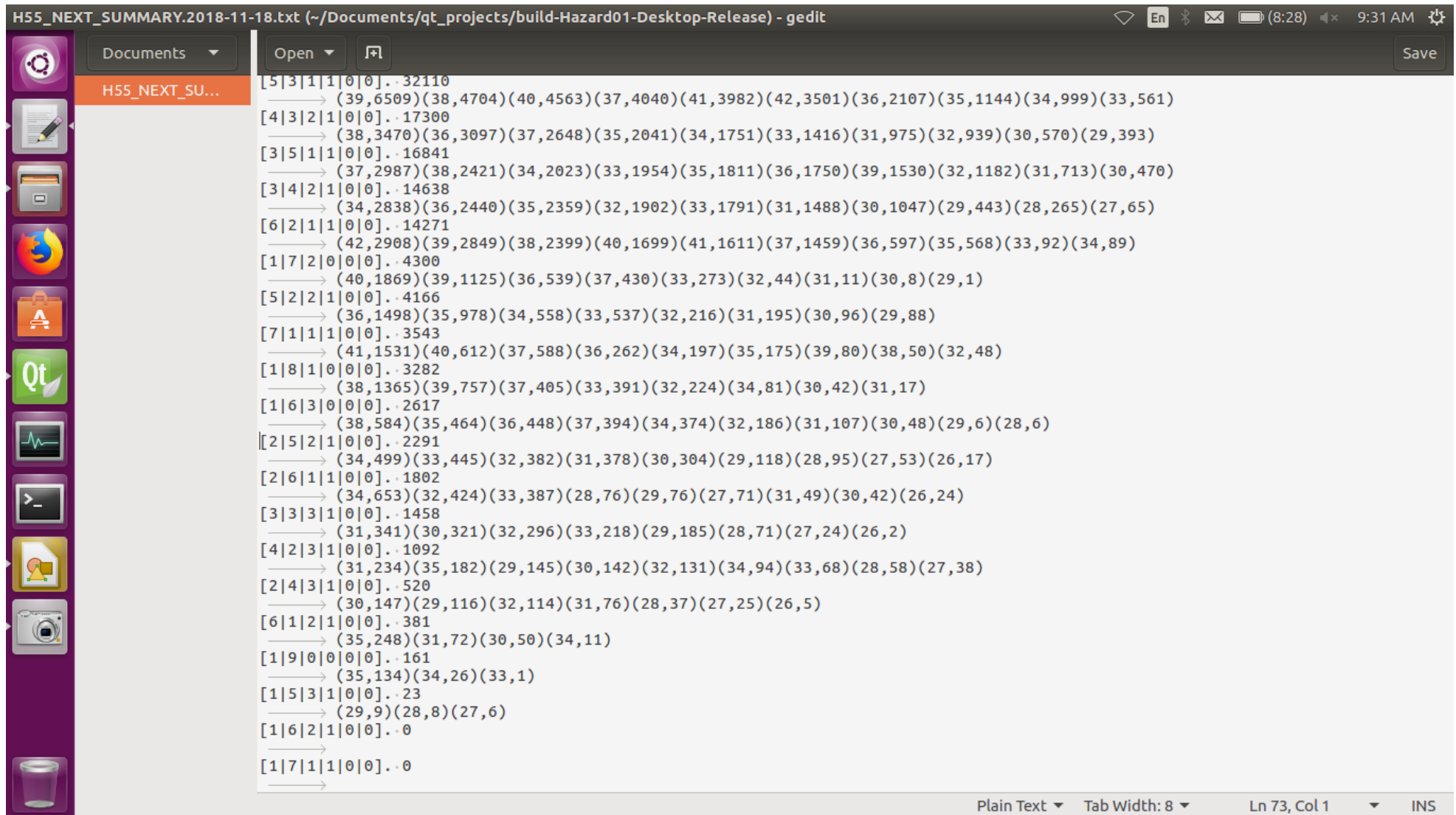


```
H55_NEXT_SUMMARY.2018-11-18.txt (~/Documents/qt_projects/build-Hazard01-Desktop-Release) - gedit
Documents
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H55_NEXT_SU...
[[2|7|1|0|0|0]. . 110834
  -> (42,15847)(44,14975)(43,14117)(41,13215)(45,11333)(46,10389)(40,9594)(39,9170)(38,7334)(37,4860)
[8|1|1|0|0|0]. . 92191
  -> (60,16670)(58,14453)(59,12843)(62,11845)(57,8841)(61,6078)(56,5879)(63,5472)(49,5365)(55,4745)
[5|2|3|0|0|0]. . 64104
  -> (41,12750)(40,9138)(39,9090)(43,7851)(42,7472)(38,6813)(37,4076)(36,3262)(35,2320)(34,1332)
[2|5|3|0|0|0]. . 54757
  -> (40,7327)(38,7064)(41,7038)(39,6982)(37,6145)(42,5407)(36,4991)(35,4476)(34,2902)(33,2425)
[7|1|2|0|0|0]. . 45247
  -> (46,7752)(44,7441)(41,6361)(43,5057)(45,4445)(40,3786)(49,3693)(39,3213)(42,1982)(38,1517)
[9|1|0|0|0|0]. . 38998
  -> (70,25836)(69,3264)(67,3204)(66,2573)(68,2350)(65,773)(62,390)(64,263)(63,234)(61,111)
[2|8|0|0|0|0]. . 38596
  -> (42,6338)(39,6260)(40,5075)(41,4698)(46,4646)(37,4020)(38,3655)(36,1948)(35,1242)(34,714)
[4|4|1|1|0|0]. . 36920
  -> (38,5399)(40,4645)(37,4631)(39,4558)(36,4220)(41,3659)(35,3313)(34,2969)(33,2283)(32,1243)
[5|3|1|1|0|0]. . 32110
  -> (39,6509)(38,4704)(40,4563)(37,4040)(41,3982)(42,3501)(36,2107)(35,1144)(34,999)(33,561)
[4|3|2|1|0|0]. . 17300
  -> (38,3470)(36,3097)(37,2648)(35,2041)(34,1751)(33,1416)(31,975)(32,939)(30,570)(29,393)
[3|5|1|1|0|0]. . 16841
  -> (37,2987)(38,2421)(34,2023)(33,1954)(35,1811)(36,1750)(39,1530)(32,1182)(31,713)(30,470)
[3|4|2|1|0|0]. . 14638
  -> (34,2838)(36,2440)(35,2359)(32,1902)(33,1791)(31,1488)(30,1047)(29,443)(28,265)(27,65)
[6|2|1|1|0|0]. . 14271
  -> (42,2908)(39,2849)(38,2399)(40,1699)(41,1611)(37,1459)(36,597)(35,568)(33,92)(34,89)
[1|7|2|0|0|0]. . 4300
  -> (40,1869)(39,1125)(36,539)(37,430)(33,273)(32,44)(31,11)(30,8)(29,1)
[5|2|2|1|0|0]. . 4166
  -> (36,1498)(35,978)(34,558)(33,537)(32,216)(31,195)(30,96)(29,88)
[7|1|1|1|0|0]. . 3543
  -> (41,1531)(40,612)(37,588)(36,262)(34,197)(35,175)(39,80)(38,50)(32,48)
[1|8|1|0|0|0]. . 3282
  -> (38,1365)(39,757)(37,405)(33,391)(32,224)(34,81)(30,42)(31,17)
[1|6|3|0|0|0]. . 2617
  -> (38,584)(35,464)(36,448)(37,394)(34,374)(32,186)(31,107)(30,48)(29,6)(28,6)
[2|5|2|1|0|0]. . 2291
  -> (34,499)(33,445)(32,382)(31,378)(30,304)(29,118)(28,95)(27,53)(26,17)
[2|6|1|1|0|0]. . 1802
  -> (34,652)(33,424)(32,387)(38,76)(30,76)(37,71)(31,40)(30,42)(26,24)

Plain Text Tab Width: 8 Ln 37, Col 1 INS
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# Rule 451, all options-3



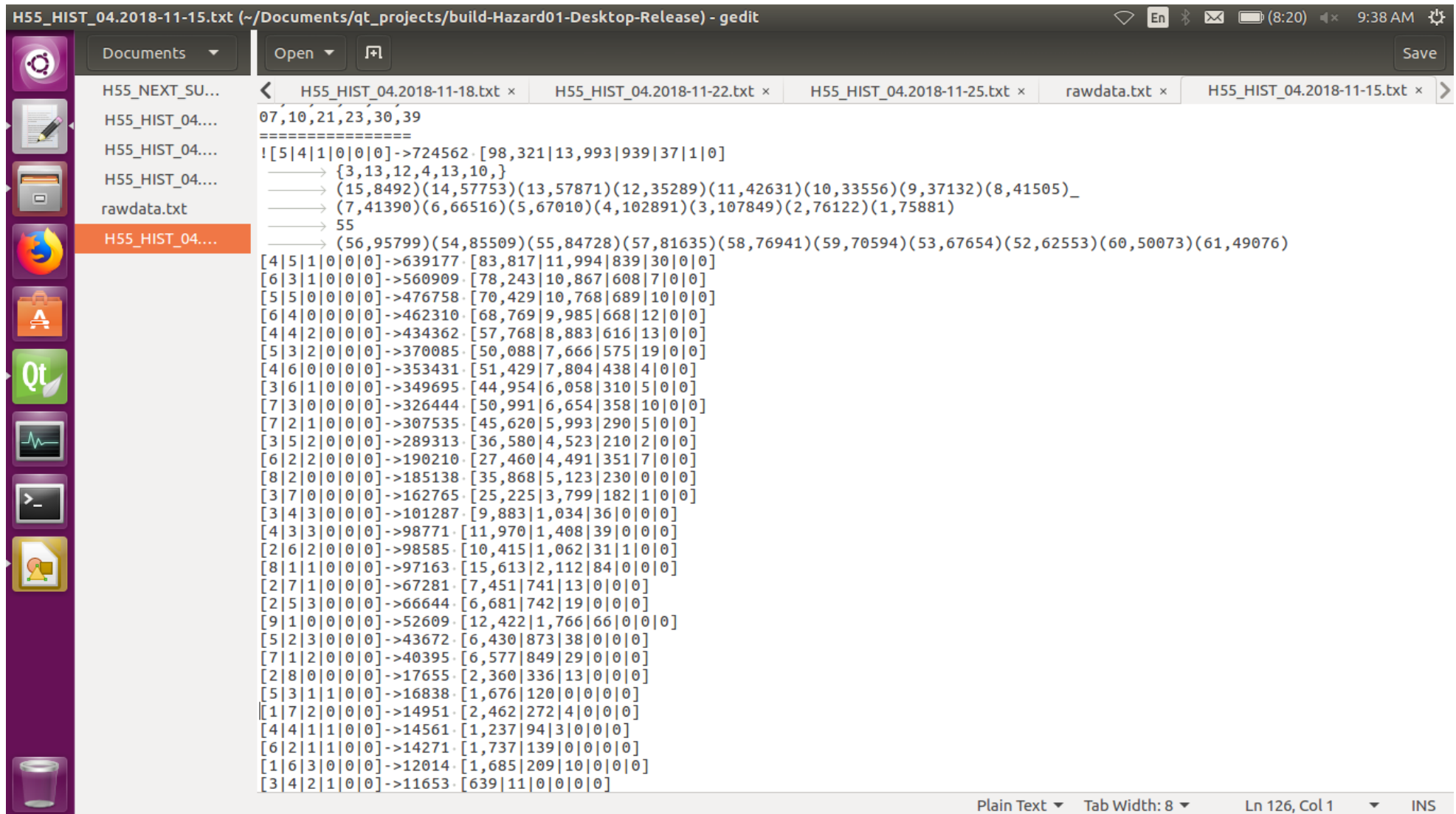
```
H55_NEXT_SUMMARY.2018-11-18.txt (~/.Documents/qt_projects/build-Hazard01-Desktop-Release) - gedit
Documents
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Save

H55_NEXT_SU...
[5|3|1|1|0|0]. 32110
    (39,6509)(38,4704)(40,4563)(37,4040)(41,3982)(42,3501)(36,2107)(35,1144)(34,999)(33,561)
[4|3|2|1|0|0]. 17300
    (38,3470)(36,3097)(37,2648)(35,2041)(34,1751)(33,1416)(31,975)(32,939)(30,570)(29,393)
[3|5|1|1|0|0]. 16841
    (37,2987)(38,2421)(34,2023)(33,1954)(35,1811)(36,1750)(39,1530)(32,1182)(31,713)(30,470)
[3|4|2|1|0|0]. 14638
    (34,2838)(36,2440)(35,2359)(32,1902)(33,1791)(31,1488)(30,1047)(29,443)(28,265)(27,65)
[6|2|1|1|0|0]. 14271
    (42,2908)(39,2849)(38,2399)(40,1699)(41,1611)(37,1459)(36,597)(35,568)(33,92)(34,89)
[1|7|2|0|0|0]. 4300
    (40,1869)(39,1125)(36,539)(37,430)(33,273)(32,44)(31,11)(30,8)(29,1)
[5|2|2|1|0|0]. 4166
    (36,1498)(35,978)(34,558)(33,537)(32,216)(31,195)(30,96)(29,88)
[7|1|1|1|0|0]. 3543
    (41,1531)(40,612)(37,588)(36,262)(34,197)(35,175)(39,80)(38,50)(32,48)
[1|8|1|0|0|0]. 3282
    (38,1365)(39,757)(37,405)(33,391)(32,224)(34,81)(30,42)(31,17)
[1|6|3|0|0|0]. 2617
    (38,584)(35,464)(36,448)(37,394)(34,374)(32,186)(31,107)(30,48)(29,6)(28,6)
[2|5|2|1|0|0]. 2291
    (34,499)(33,445)(32,382)(31,378)(30,304)(29,118)(28,95)(27,53)(26,17)
[2|6|1|1|0|0]. 1802
    (34,653)(32,424)(33,387)(28,76)(29,76)(27,71)(31,49)(30,42)(26,24)
[3|3|3|1|0|0]. 1458
    (31,341)(30,321)(32,296)(33,218)(29,185)(28,71)(27,24)(26,2)
[4|2|3|1|0|0]. 1092
    (31,234)(35,182)(29,145)(30,142)(32,131)(34,94)(33,68)(28,58)(27,38)
[2|4|3|1|0|0]. 520
    (30,147)(29,116)(32,114)(31,76)(28,37)(27,25)(26,5)
[6|1|2|1|0|0]. 381
    (35,248)(31,72)(30,50)(34,11)
[1|9|0|0|0|0]. 161
    (35,134)(34,26)(33,1)
[1|5|3|1|0|0]. 23
    (29,9)(28,8)(27,6)
[1|6|2|1|0|0]. 0
[1|7|1|1|0|0]. 0
```

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# Rule 451, success

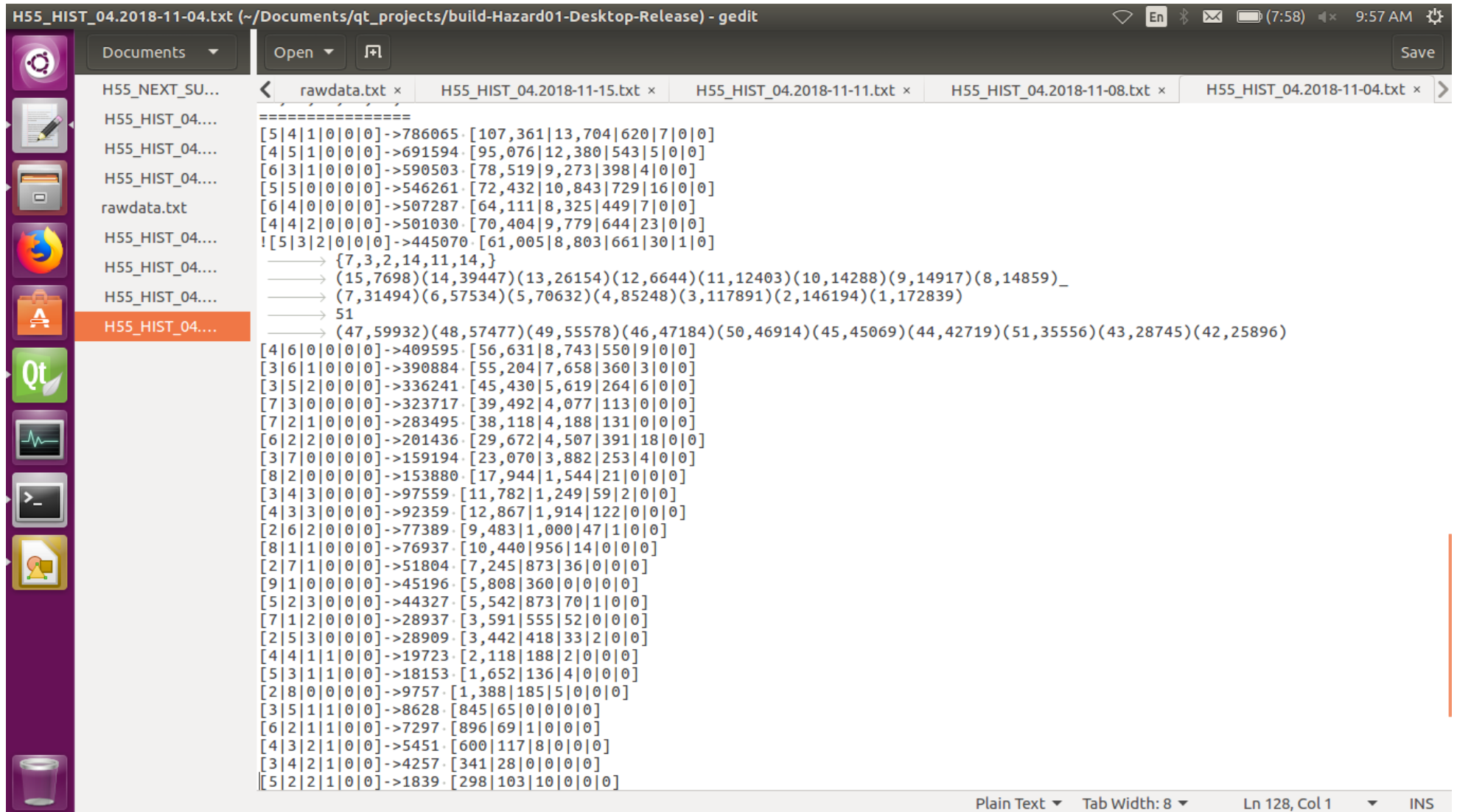


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H55_HIST_04.2018-11-15.txt (~/.Documents/qt_projects/build-Hazard01-Desktop-Release) - gedit
Documents
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H55_NEXT_SU...
H55_HIST_04....
H55_HIST_04....
H55_HIST_04....
rawdata.txt
H55_HIST_04....

07,10,21,23,30,39
=====
! [5|4|1|0|0|0] -> 724562. [98,321|13,993|939|37|1|0]
    -> {3,13,12,4,13,10,}
    -> (15,8492)(14,57753)(13,57871)(12,35289)(11,42631)(10,33556)(9,37132)(8,41505)_
    -> (7,41390)(6,66516)(5,67010)(4,102891)(3,107849)(2,76122)(1,75881)
    -> 55
    -> (56,95799)(54,85509)(55,84728)(57,81635)(58,76941)(59,70594)(53,67654)(52,62553)(60,50073)(61,49076)
[4|5|1|0|0|0] -> 639177. [83,817|11,994|839|30|0|0]
[6|3|1|0|0|0] -> 560909. [78,243|10,867|608|7|0|0]
[5|5|0|0|0|0] -> 476758. [70,429|10,768|689|10|0|0]
[6|4|0|0|0|0] -> 462310. [68,769|9,985|668|12|0|0]
[4|4|2|0|0|0] -> 434362. [57,768|8,883|616|13|0|0]
[5|3|2|0|0|0] -> 370085. [50,088|7,666|575|19|0|0]
[4|6|0|0|0|0] -> 353431. [51,429|7,804|438|4|0|0]
[3|6|1|0|0|0] -> 349695. [44,954|6,058|310|5|0|0]
[7|3|0|0|0|0] -> 326444. [50,991|6,654|358|10|0|0]
[7|2|1|0|0|0] -> 307535. [45,620|5,993|290|5|0|0]
[3|5|2|0|0|0] -> 289313. [36,580|4,523|210|2|0|0]
[6|2|2|0|0|0] -> 190210. [27,460|4,491|351|7|0|0]
[8|2|0|0|0|0] -> 185138. [35,868|5,123|230|0|0|0]
[3|7|0|0|0|0] -> 162765. [25,225|3,799|182|1|0|0]
[3|4|3|0|0|0] -> 101287. [9,883|1,034|36|0|0|0]
[4|3|3|0|0|0] -> 98771. [11,970|1,408|39|0|0|0]
[2|6|2|0|0|0] -> 98585. [10,415|1,062|31|1|0|0]
[8|1|1|0|0|0] -> 97163. [15,613|2,112|84|0|0|0]
[2|7|1|0|0|0] -> 67281. [7,451|741|13|0|0|0]
[2|5|3|0|0|0] -> 66644. [6,681|742|19|0|0|0]
[9|1|0|0|0|0] -> 52609. [12,422|1,766|66|0|0|0]
[5|2|3|0|0|0] -> 43672. [6,430|873|38|0|0|0]
[7|1|2|0|0|0] -> 40395. [6,577|849|29|0|0|0]
[2|8|0|0|0|0] -> 17655. [2,360|336|13|0|0|0]
[5|3|1|1|0|0] -> 16838. [1,676|120|0|0|0|0]
[1|7|2|0|0|0] -> 14951. [2,462|272|4|0|0|0]
[4|4|1|1|0|0] -> 14561. [1,237|94|3|0|0|0]
[6|2|1|1|0|0] -> 14271. [1,737|139|0|0|0|0]
[1|6|3|0|0|0] -> 12014. [1,685|209|10|0|0|0]
[3|4|2|1|0|0] -> 11653. [639|11|0|0|0|0]
```

# Rule 451, success



```
H55_HIST_04.2018-11-04.txt (~/.Documents/qt_projects/build-Hazard01-Desktop-Release) - gedit
Documents
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H55_NEXT_SU...
H55_HIST_04....
H55_HIST_04....
H55_HIST_04....
rawdata.txt
H55_HIST_04....
H55_HIST_04....
H55_HIST_04....
H55_HIST_04....
H55_HIST_04....

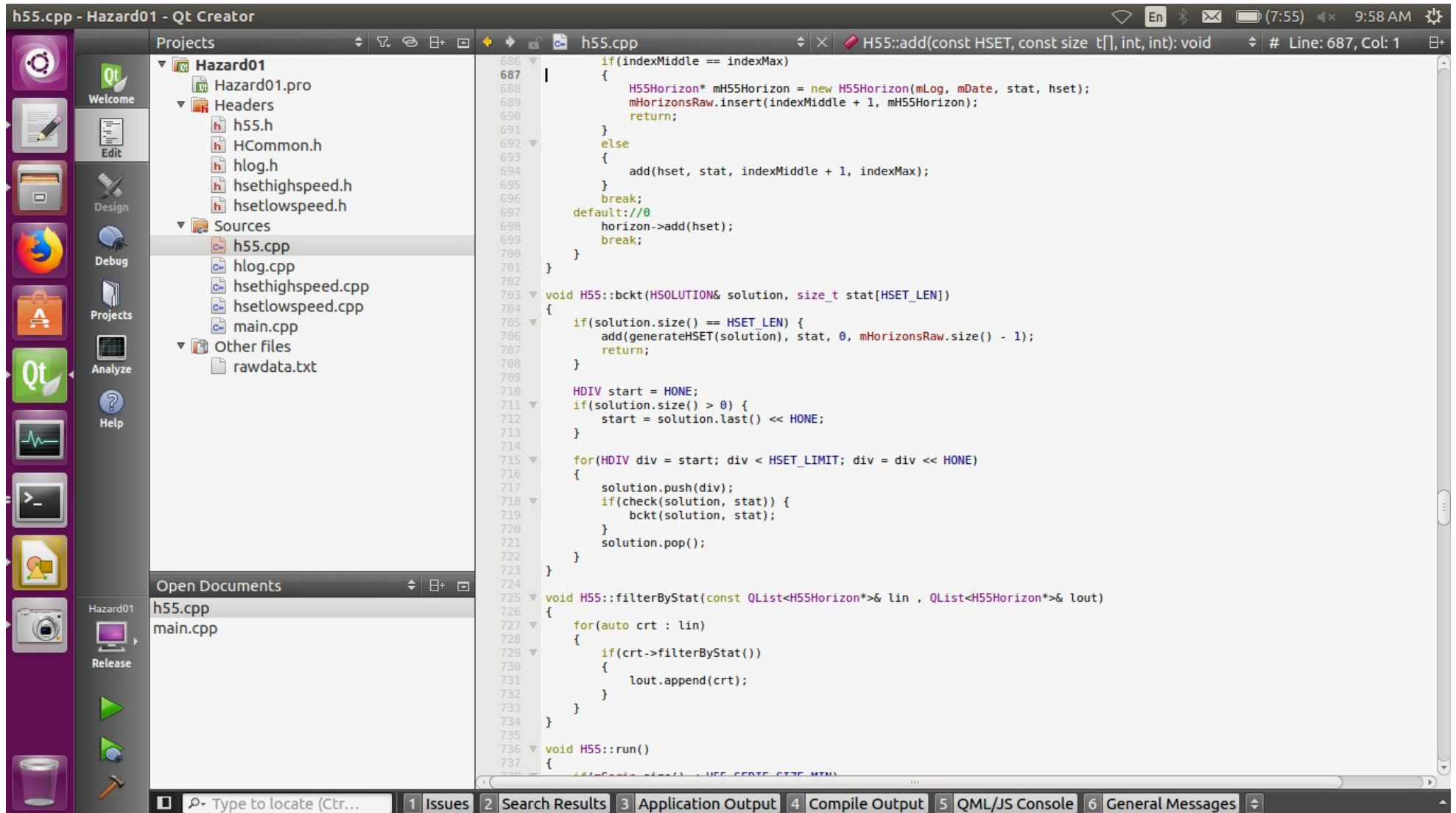
rawdata.txt x H55_HIST_04.2018-11-15.txt x H55_HIST_04.2018-11-11.txt x H55_HIST_04.2018-11-08.txt x H55_HIST_04.2018-11-04.txt x

=====
[5|4|1|0|0|0]->786065·[107,361|13,704|620|7|0|0]
[4|5|1|0|0|0]->691594·[95,076|12,380|543|5|0|0]
[6|3|1|0|0|0]->590503·[78,519|9,273|398|4|0|0]
[5|5|0|0|0|0]->546261·[72,432|10,843|729|16|0|0]
[6|4|0|0|0|0]->507287·[64,111|8,325|449|7|0|0]
[4|4|2|0|0|0]->501030·[70,404|9,779|644|23|0|0]
! [5|3|2|0|0|0]->445070·[61,005|8,803|661|30|1|0]
    -> {7,3,2,14,11,14,}
    -> (15,7698)(14,39447)(13,26154)(12,6644)(11,12403)(10,14288)(9,14917)(8,14859)_
    -> (7,31494)(6,57534)(5,70632)(4,85248)(3,117891)(2,146194)(1,172839)
    -> 51
    -> (47,59932)(48,57477)(49,55578)(46,47184)(50,46914)(45,45069)(44,42719)(51,35556)(43,28745)(42,25896)
[4|6|0|0|0|0]->409595·[56,631|8,743|550|9|0|0]
[3|6|1|0|0|0]->390884·[55,204|7,658|360|3|0|0]
[3|5|2|0|0|0]->336241·[45,430|5,619|264|6|0|0]
[7|3|0|0|0|0]->323717·[39,492|4,077|113|0|0|0]
[7|2|1|0|0|0]->283495·[38,118|4,188|131|0|0|0]
[6|2|2|0|0|0]->201436·[29,672|4,507|391|18|0|0]
[3|7|0|0|0|0]->159194·[23,070|3,882|253|4|0|0]
[8|2|0|0|0|0]->153880·[17,944|1,544|21|0|0|0]
[3|4|3|0|0|0]->97559·[11,782|1,249|59|2|0|0]
[4|3|3|0|0|0]->92359·[12,867|1,914|122|0|0|0]
[2|6|2|0|0|0]->77389·[9,483|1,000|47|1|0|0]
[8|1|1|0|0|0]->76937·[10,440|956|14|0|0|0]
[2|7|1|0|0|0]->51804·[7,245|873|36|0|0|0]
[9|1|0|0|0|0]->45196·[5,808|360|0|0|0|0]
[5|2|3|0|0|0]->44327·[5,542|873|70|1|0|0]
[7|1|2|0|0|0]->28937·[3,591|555|52|0|0|0]
[2|5|3|0|0|0]->28909·[3,442|418|33|2|0|0]
[4|4|1|1|0|0]->19723·[2,118|188|2|0|0|0]
[5|3|1|1|0|0]->18153·[1,652|136|4|0|0|0]
[2|8|0|0|0|0]->9757·[1,388|185|5|0|0|0]
[3|5|1|1|0|0]->8628·[845|65|0|0|0|0]
[6|2|1|1|0|0]->7297·[896|69|1|0|0|0]
[4|3|2|1|0|0]->5451·[600|117|8|0|0|0]
[3|4|2|1|0|0]->4257·[341|28|0|0|0|0]
[5|2|2|1|0|0]->1839·[298|103|10|0|0|0]
```

Plain Text Tab Width: 8 Ln 128, Col 1 INS



# Rule 451, generate all combinations

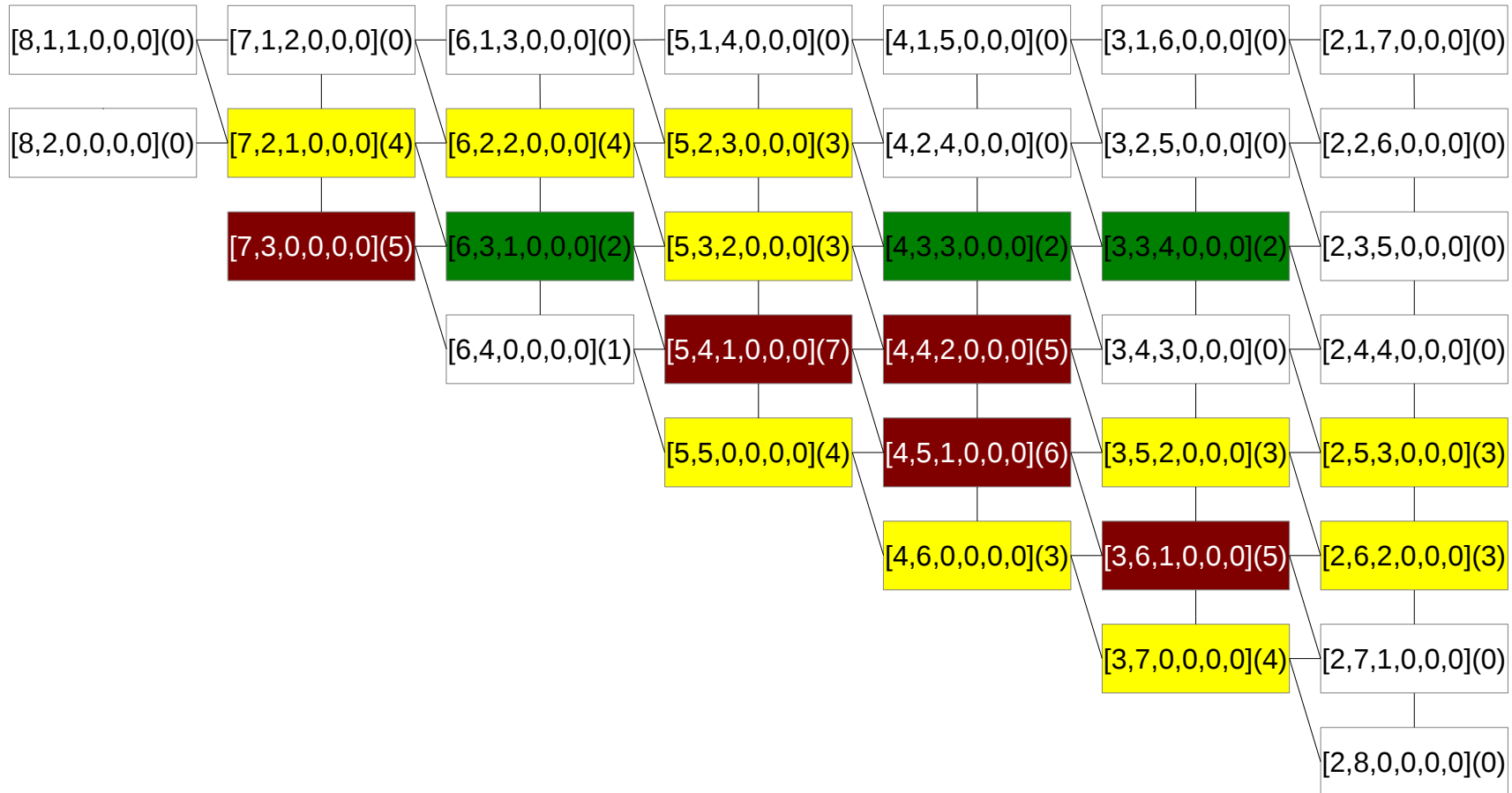


# Rule 451, add to horizon

The screenshot shows the Qt Creator IDE with the project 'Hazard01' open. The file explorer on the left shows the project structure, including headers and sources. The main editor displays the code for 'h55.cpp', specifically the 'add' function. The function implements a binary search algorithm to find the correct index for adding a new horizon to a list of horizons. The code is as follows:

```
652 }
653
654 return true;
655 }
656
657 void H55::add(const HSET hset, const size_t stat[HSET_LEN], int indexMin, int indexMax)
658 {
659     if(mHorizonsRaw.isEmpty())
660     {
661         H55Horizon* mH55Horizon = new H55Horizon(mLog, mDate, stat, hset);
662         mHorizonsRaw.append(mH55Horizon);
663     }
664     return;
665 }
666
667 int indexMiddle = (indexMin + indexMax) >> 1;
668 H55Horizon* horizon = mHorizonsRaw[indexMiddle];
669 int compareMiddle = horizon->compare(stat);
670
671 switch(compareMiddle)
672 {
673     case -1:
674         if(indexMin == indexMiddle)
675         {
676             H55Horizon* mH55Horizon = new H55Horizon(mLog, mDate, stat, hset);
677             mHorizonsRaw.insert(indexMiddle, mH55Horizon);
678             return;
679         }
680         else
681         {
682             add(hset, stat, indexMin, indexMiddle - 1);
683         }
684         break;
685     case 1:
686         if(indexMiddle == indexMax)
687         {
688             H55Horizon* mH55Horizon = new H55Horizon(mLog, mDate, stat, hset);
689             mHorizonsRaw.insert(indexMiddle + 1, mH55Horizon);
690             return;
691         }
692         else
693         {
694             add(hset, stat, indexMiddle + 1, indexMax);
695         }
696         break;
697     default://0
698         horizon->add(hset);
699         break;
700 }
701 }
702
703 void H55::bckt(HSOLUTION& solution, size_t stat[HSET_LEN])
```

# Rule 451-distribution



**Rule 451 – The sets cannot combine infinitely. The combinations follow a normal distribution.**

[illegible]

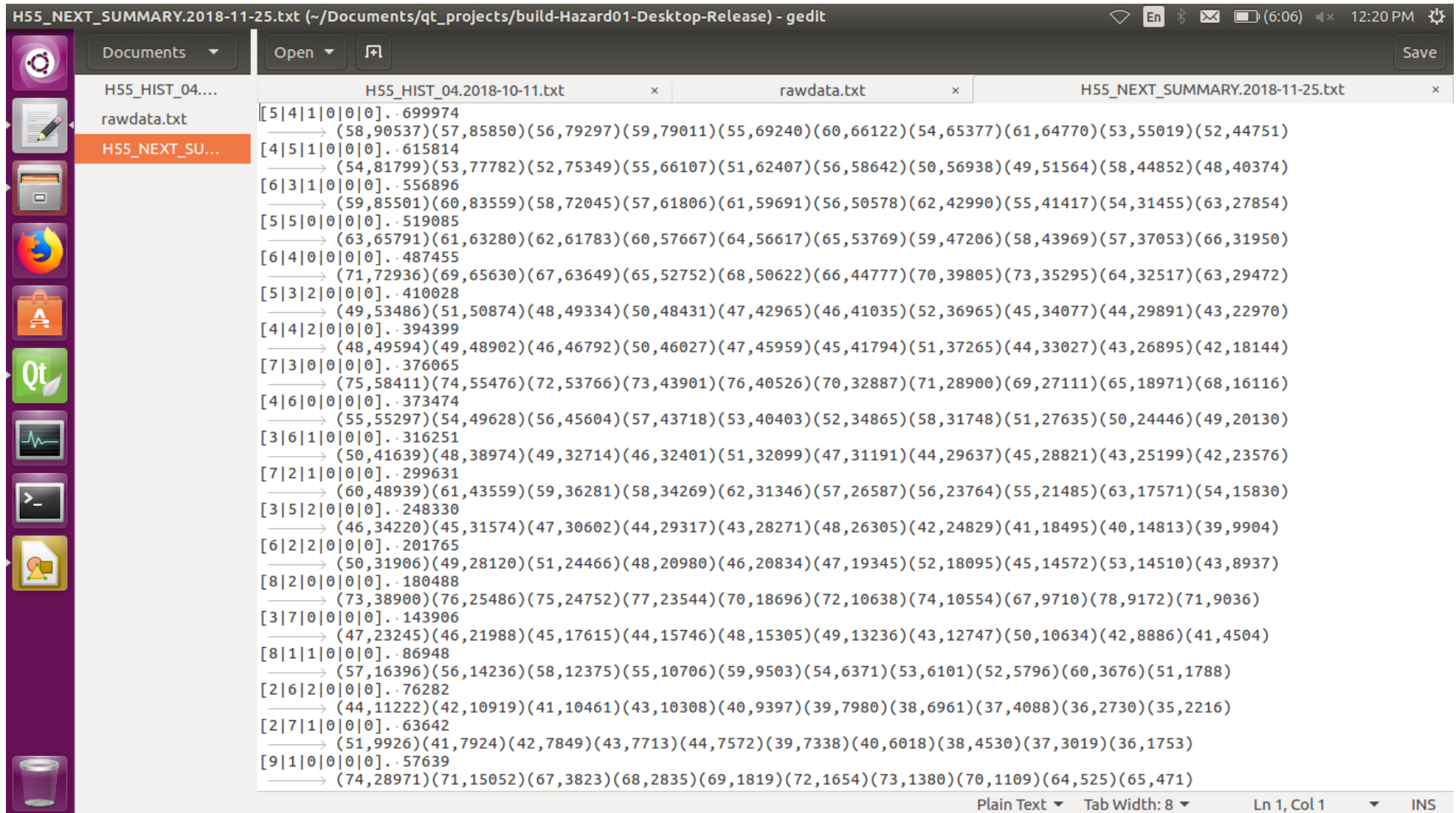
# Neighbours

**There are 254 sets having 5 the intersection length with the first one.**





# Neighbours, search the sets having a big number of neighbours



```
H55_NEXT_SUMMARY.2018-11-25.txt (~/Documents/qt_projects/build-Hazard01-Desktop-Release) - gedit
Documents
Open
Save

H55_HIST_04....
rawdata.txt
H55_NEXT_SU...

[5|4|1|0|0|0]. · 699974
→ (58,90537)(57,85850)(56,79297)(59,79011)(55,69240)(60,66122)(54,65377)(61,64770)(53,55019)(52,44751)
[4|5|1|0|0|0]. · 615814
→ (54,81799)(53,77782)(52,75349)(55,66107)(51,62407)(56,58642)(50,56938)(49,51564)(58,44852)(48,40374)
[6|3|1|0|0|0]. · 556896
→ (59,85501)(60,83559)(58,72045)(57,61806)(61,59691)(56,50578)(62,42990)(55,41417)(54,31455)(63,27854)
[5|5|0|0|0|0]. · 519085
→ (63,65791)(61,63280)(62,61783)(60,57667)(64,56617)(65,53769)(59,47206)(58,43969)(57,37053)(66,31950)
[6|4|0|0|0|0]. · 487455
→ (71,72936)(69,65630)(67,63649)(65,52752)(68,50622)(66,44777)(70,39805)(73,35295)(64,32517)(63,29472)
[5|3|2|0|0|0]. · 410028
→ (49,53486)(51,50874)(48,49334)(50,48431)(47,42965)(46,41035)(52,36965)(45,34077)(44,29891)(43,22970)
[4|4|2|0|0|0]. · 394399
→ (48,49594)(49,48902)(46,46792)(50,46027)(47,45959)(45,41794)(51,37265)(44,33027)(43,26895)(42,18144)
[7|3|0|0|0|0]. · 376065
→ (75,58411)(74,55476)(72,53766)(73,43901)(76,40526)(70,32887)(71,28900)(69,27111)(65,18971)(68,16116)
[4|6|0|0|0|0]. · 373474
→ (55,55297)(54,49628)(56,45604)(57,43718)(53,40403)(52,34865)(58,31748)(51,27635)(50,24446)(49,20130)
[3|6|1|0|0|0]. · 316251
→ (50,41639)(48,38974)(49,32714)(46,32401)(51,32099)(47,31191)(44,29637)(45,28821)(43,25199)(42,23576)
[7|2|1|0|0|0]. · 299631
→ (60,48939)(61,43559)(59,36281)(58,34269)(62,31346)(57,26587)(56,23764)(55,21485)(63,17571)(54,15830)
[3|5|2|0|0|0]. · 248330
→ (46,34220)(45,31574)(47,30602)(44,29317)(43,28271)(48,26305)(42,24829)(41,18495)(40,14813)(39,9904)
[6|2|2|0|0|0]. · 201765
→ (50,31906)(49,28120)(51,24466)(48,20980)(46,20834)(47,19345)(52,18095)(45,14572)(53,14510)(43,8937)
[8|2|0|0|0|0]. · 180488
→ (73,38900)(76,25486)(75,24752)(77,23544)(70,18696)(72,10638)(74,10554)(67,9710)(78,9172)(71,9036)
[3|7|0|0|0|0]. · 143906
→ (47,23245)(46,21988)(45,17615)(44,15746)(48,15305)(49,13236)(43,12747)(50,10634)(42,8886)(41,4504)
[8|1|1|0|0|0]. · 86948
→ (57,16396)(56,14236)(58,12375)(55,10706)(59,9503)(54,6371)(53,6101)(52,5796)(60,3676)(51,1788)
[2|6|2|0|0|0]. · 76282
→ (44,11222)(42,10919)(41,10461)(43,10308)(40,9397)(39,7980)(38,6961)(37,4088)(36,2730)(35,2216)
[2|7|1|0|0|0]. · 63642
→ (51,9926)(41,7924)(42,7849)(43,7713)(44,7572)(39,7338)(40,6018)(38,4530)(37,3019)(36,1753)
[9|1|0|0|0|0]. · 57639
→ (74,28971)(71,15052)(67,3823)(68,2835)(69,1819)(72,1654)(73,1380)(70,1109)(64,525)(65,471)

Plain Text Tab Width: 8 Ln 1, Col 1 INS
```



**Intersecting 2 sets6 we can get maxim a set5,  
because the sets6 are distinct.**

**To intersect 1000000 set6 one with each other  
is prohibitive and does not work.**

**We need to decompose a set6 into 6 sets5.**

**[1,2,3,4,5,6]:**

**[ ,2,3,4,5,6]**

**[1, ,3,4,5,6]**

**[1,2, ,4,5,6]**

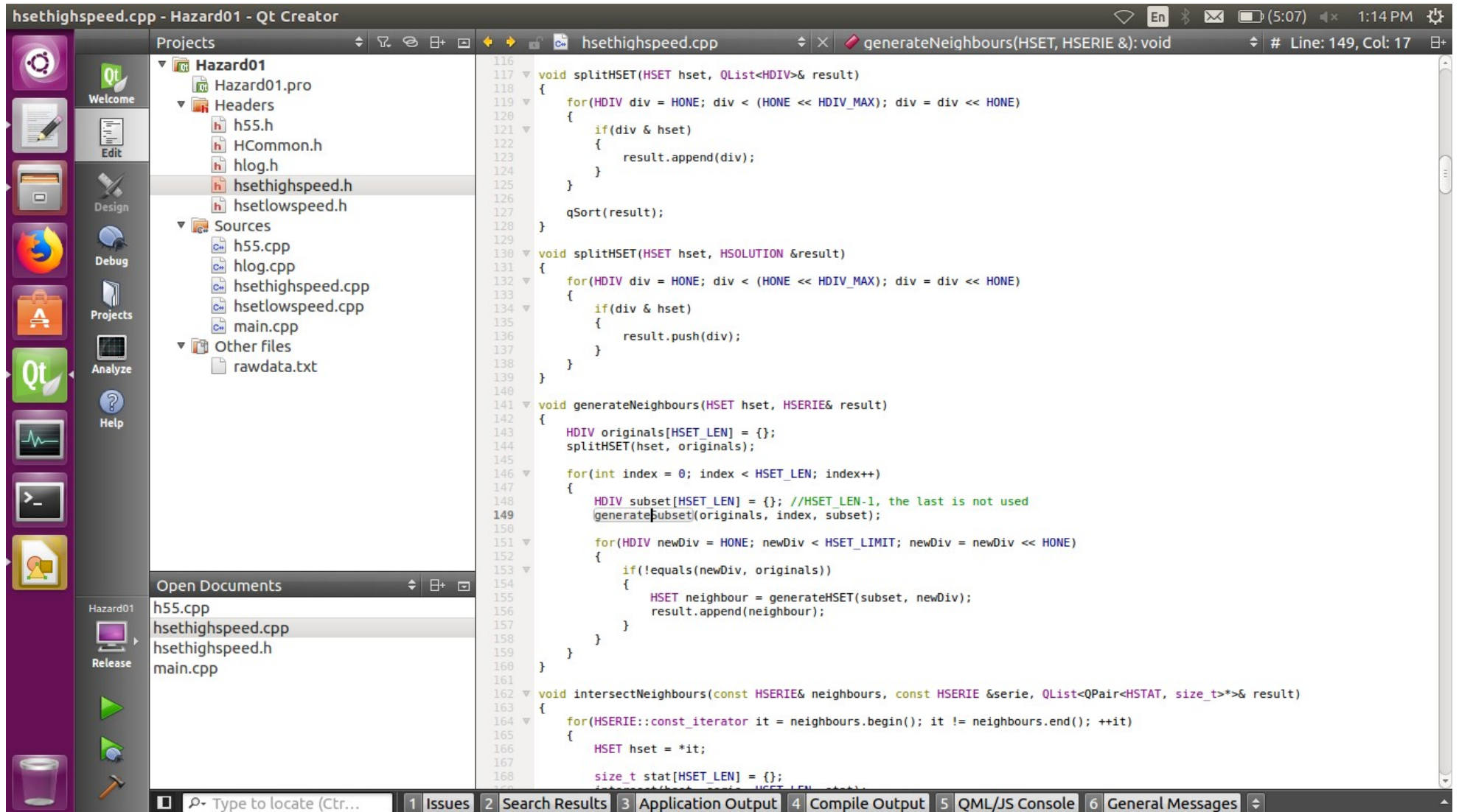
**[1,2,3, ,5,6]**

**[1,2,3,4, ,6]**

**[1,2,3,4,5, ]**

# Neighbours, the winning set has a big number of neighbours

# Neighbours, generate set5 from set6



The screenshot displays the Qt Creator IDE interface for a project named 'Hazard01'. The left sidebar shows the project structure with a 'Sources' folder containing 'h55.cpp', 'hlog.cpp', 'hsethighspeed.cpp', 'hsetlowspeed.cpp', and 'main.cpp'. The 'Open Documents' panel at the bottom left lists 'h55.cpp', 'hsethighspeed.cpp', 'hsethighspeed.h', and 'main.cpp'. The main editor window shows the implementation of the 'generateNeighbours' function in 'hsethighspeed.cpp'.

```
116 void splitHSET(HSET hset, QList<HDIV>& result)
117 {
118     for(HDIV div = HONE; div < (HONE << HDIV_MAX); div = div << HONE)
119     {
120         if(div & hset)
121         {
122             result.append(div);
123         }
124     }
125     qSort(result);
126 }
127
128 void splitHSET(HSET hset, HSOLUTION &result)
129 {
130     for(HDIV div = HONE; div < (HONE << HDIV_MAX); div = div << HONE)
131     {
132         if(div & hset)
133         {
134             result.push(div);
135         }
136     }
137 }
138
139 void generateNeighbours(HSET hset, HSERIE& result)
140 {
141     HDIV originals[HSET_LEN] = {};
142     splitHSET(hset, originals);
143     for(int index = 0; index < HSET_LEN; index++)
144     {
145         HDIV subset[HSET_LEN] = {}; //HSET_LEN-1, the last is not used
146         generateSubset(originals, index, subset);
147         for(HDIV newDiv = HONE; newDiv < HSET_LIMIT; newDiv = newDiv << HONE)
148         {
149             if(!equals(newDiv, originals))
150             {
151                 HSET neighbour = generateHSET(subset, newDiv);
152                 result.append(neighbour);
153             }
154         }
155     }
156 }
157
158 void intersectNeighbours(const HSERIE& neighbours, const HSERIE &serie, QList<QPair<HSTAT, size_t>*>& result)
159 {
160     for(HSERIE::const_iterator it = neighbours.begin(); it != neighbours.end(); ++it)
161     {
162         HSET hset = *it;
163         size_t stat[HSET_LEN] = {};
164         intersectNeighbours(hset, serie, stat);
165     }
166 }
```

The status bar at the bottom indicates the current line and column: # Line: 149, Col: 17. The bottom panel shows tabs for 'Issues', 'Search Results', 'Application Output', 'Compile Output', 'QML/JS Console', and 'General Messages'.



# Neighbours, winning set and has a big number of neighbours

The image shows a Qt text editor window with a dark theme. The title bar at the top reads "H55\_HIST\_04.2018-10-25.txt (~:/Documents/qt\_projects/build-Hazard01-Desktop-Release) - gedit". The editor has two tabs: "rawdata.txt" and "H55\_HIST\_04.2018-10-25.txt". The active tab, "H55\_HIST\_04.2018-10-25.txt", contains a list of data points. Each data point is a 1D histogram with 10 bins, represented as a list of 10 values separated by vertical bars. The data points are grouped into several sections, some with labels like "rawdata.txt" and "H55\_HIST\_04.2018-10-25.txt". The histogram data is displayed as a list of 10 values for each point, separated by vertical bars. The editor interface includes a sidebar with icons for various applications, a top menu bar, and a status bar at the bottom showing "Plain Text", "Tab Width: 8", "Ln 86, Col 1", and "INS".

## How to play:

Source code: <http://github.com/aflathorea/Hazard>

Download Qt framework from [www.qt.io](http://www.qt.io)

In the app dir should be the file: rawdata.txt. The file should have, at least, the lasts 10 sets.

Run Hazard app

H55\_HIST\_04.YYYY-MM-DD.txt contains the analysis for the last set, in the case there are 11 sets in rawdata.txt file.

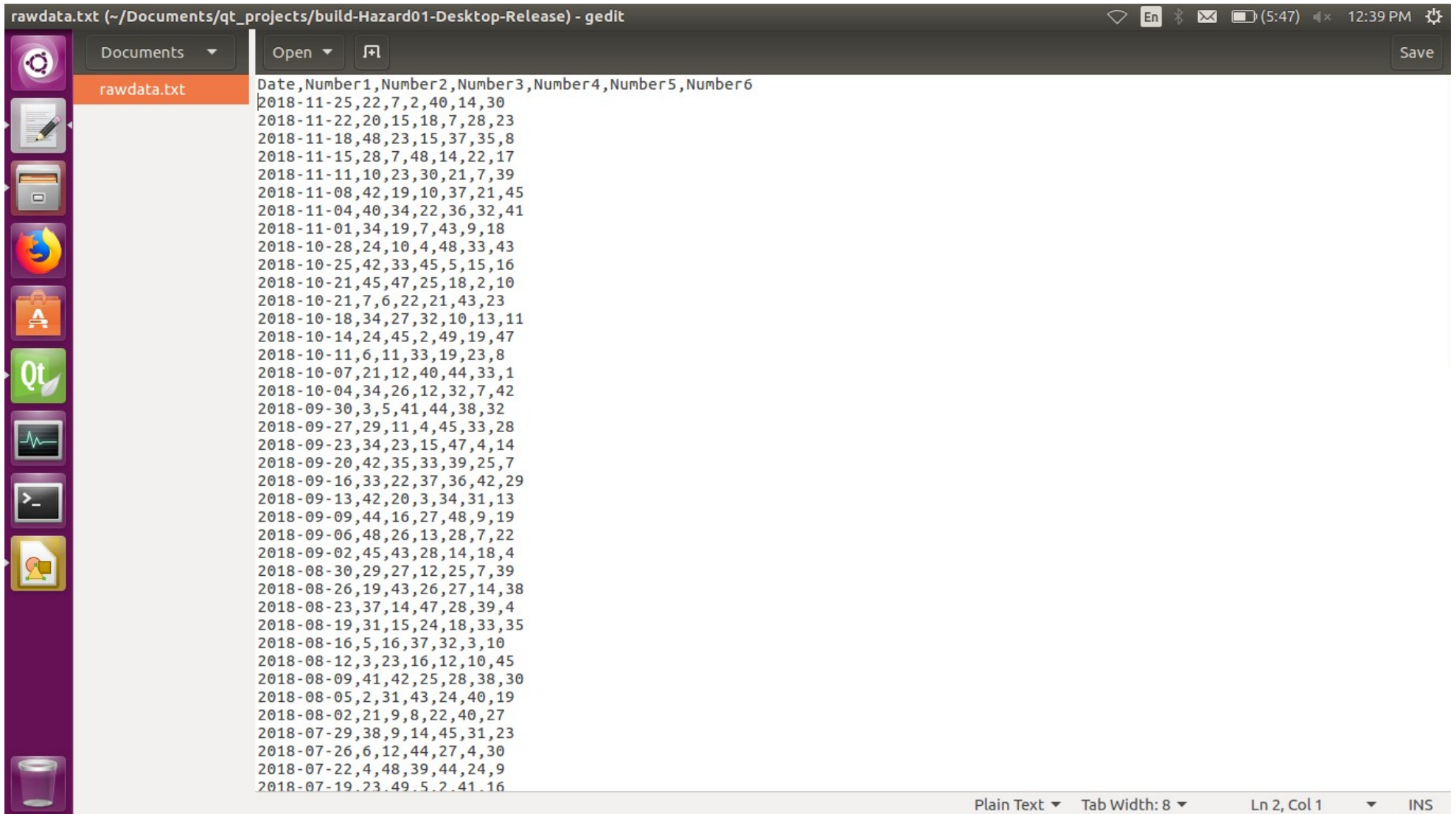
H55\_NEXT\_SUMMARY.YYYY-MM-DD.txt contains the summary forecast: the sets enumeration with the corresponding neighbours.

H55\_NEXT.YYYY-MM-DD\_4510.txt

H55\_NEXT.YYYY-MM-DD\_5410.txt

Contains the sets for each horizon.

# rawdata.txt



```
rawdata.txt (~/.Documents/qt_projects/build-Hazard01-Desktop-Release) - gedit
Documents
rawdata.txt
Date,Number1,Number2,Number3,Number4,Number5,Number6
2018-11-25,22,7,2,40,14,30
2018-11-22,20,15,18,7,28,23
2018-11-18,48,23,15,37,35,8
2018-11-15,28,7,48,14,22,17
2018-11-11,10,23,30,21,7,39
2018-11-08,42,19,10,37,21,45
2018-11-04,40,34,22,36,32,41
2018-11-01,34,19,7,43,9,18
2018-10-28,24,10,4,48,33,43
2018-10-25,42,33,45,5,15,16
2018-10-21,45,47,25,18,2,10
2018-10-21,7,6,22,21,43,23
2018-10-18,34,27,32,10,13,11
2018-10-14,24,45,2,49,19,47
2018-10-11,6,11,33,19,23,8
2018-10-07,21,12,40,44,33,1
2018-10-04,34,26,12,32,7,42
2018-09-30,3,5,41,44,38,32
2018-09-27,29,11,4,45,33,28
2018-09-23,34,23,15,47,4,14
2018-09-20,42,35,33,39,25,7
2018-09-16,33,22,37,36,42,29
2018-09-13,42,20,3,34,31,13
2018-09-09,44,16,27,48,9,19
2018-09-06,48,26,13,28,7,22
2018-09-02,45,43,28,14,18,4
2018-08-30,29,27,12,25,7,39
2018-08-26,19,43,26,27,14,38
2018-08-23,37,14,47,28,39,4
2018-08-19,31,15,24,18,33,35
2018-08-16,5,16,37,32,3,10
2018-08-12,3,23,16,12,10,45
2018-08-09,41,42,25,28,38,30
2018-08-05,2,31,43,24,40,19
2018-08-02,21,9,8,22,40,27
2018-07-29,38,9,14,45,31,23
2018-07-26,6,12,44,27,4,30
2018-07-22,4,48,39,44,24,9
2018-07-19,23,49,5,2,41,16
Plain Text Tab Width: 8 Ln 2, Col 1 INS
```



**rawdata.txt**

**The first row is the header, does not count.**

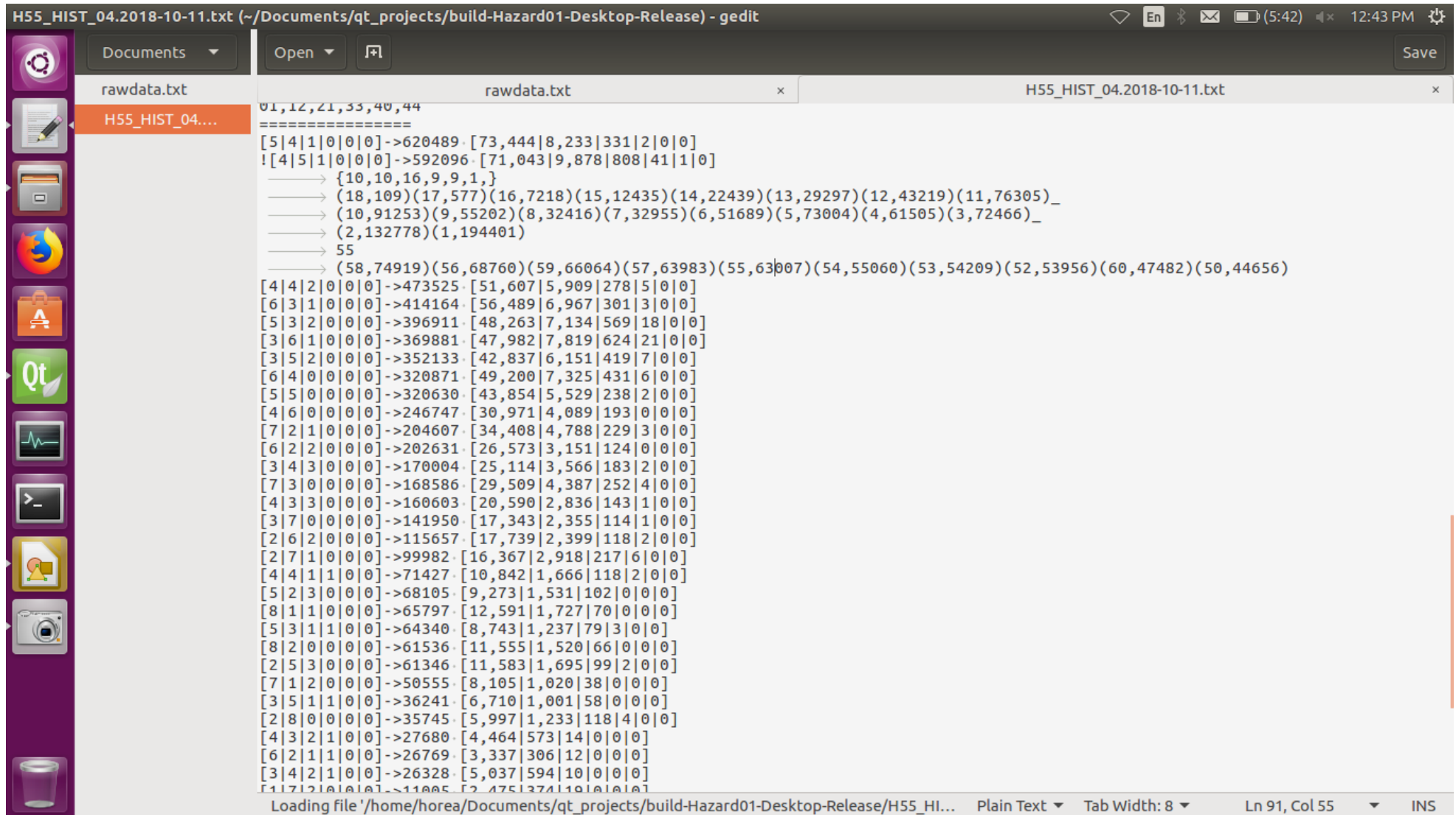
**At least 10 sets.**

**If there are 11 sets, the app makes analysis for the last one.**

**The sets are ordered descending, the more recent is in top.**

**With "--" comment a set.**

# H55\_HIST\_04.YYYY-MM-DD.txt



```
H55_HIST_04.2018-10-11.txt (~/.Documents/qt_projects/build-Hazard01-Desktop-Release) - gedit
Documents
Open
rawdata.txt
H55_HIST_04....
01,12,21,33,40,44
=====
[5|4|1|0|0|0]->620489.[73,444|8,233|331|2|0|0]
! [4|5|1|0|0|0]->592096.[71,043|9,878|808|41|1|0]
----->{10,10,16,9,9,1,}
----->(18,109)(17,577)(16,7218)(15,12435)(14,22439)(13,29297)(12,43219)(11,76305)_
----->(10,91253)(9,55202)(8,32416)(7,32955)(6,51689)(5,73004)(4,61505)(3,72466)_
----->(2,132778)(1,194401)
----->55
----->(58,74919)(56,68760)(59,66064)(57,63983)(55,63007)(54,55060)(53,54209)(52,53956)(60,47482)(50,44656)
[4|4|2|0|0|0]->473525.[51,607|5,909|278|5|0|0]
[6|3|1|0|0|0]->414164.[56,489|6,967|301|3|0|0]
[5|3|2|0|0|0]->396911.[48,263|7,134|569|18|0|0]
[3|6|1|0|0|0]->369881.[47,982|7,819|624|21|0|0]
[3|5|2|0|0|0]->352133.[42,837|6,151|419|7|0|0]
[6|4|0|0|0|0]->320871.[49,200|7,325|431|6|0|0]
[5|5|0|0|0|0]->320630.[43,854|5,529|238|2|0|0]
[4|6|0|0|0|0]->246747.[30,971|4,089|193|0|0|0]
[7|2|1|0|0|0]->204607.[34,408|4,788|229|3|0|0]
[6|2|2|0|0|0]->202631.[26,573|3,151|124|0|0|0]
[3|4|3|0|0|0]->170004.[25,114|3,566|183|2|0|0]
[7|3|0|0|0|0]->168586.[29,509|4,387|252|4|0|0]
[4|3|3|0|0|0]->160603.[20,590|2,836|143|1|0|0]
[3|7|0|0|0|0]->141950.[17,343|2,355|114|1|0|0]
[2|6|2|0|0|0]->115657.[17,739|2,399|118|2|0|0]
[2|7|1|0|0|0]->99982.[16,367|2,918|217|6|0|0]
[4|4|1|1|0|0]->71427.[10,842|1,666|118|2|0|0]
[5|2|3|0|0|0]->68105.[9,273|1,531|102|0|0|0]
[8|1|1|0|0|0]->65797.[12,591|1,727|70|0|0|0]
[5|3|1|1|0|0]->64340.[8,743|1,237|79|3|0|0]
[8|2|0|0|0|0]->61536.[11,555|1,520|66|0|0|0]
[2|5|3|0|0|0]->61346.[11,583|1,695|99|2|0|0]
[7|1|2|0|0|0]->50555.[8,105|1,020|38|0|0|0]
[3|5|1|1|0|0]->36241.[6,710|1,001|58|0|0|0]
[2|8|0|0|0|0]->35745.[5,997|1,233|118|4|0|0]
[4|3|2|1|0|0]->27680.[4,464|573|14|0|0|0]
[6|2|1|1|0|0]->26769.[3,337|306|12|0|0|0]
[3|4|2|1|0|0]->26328.[5,037|594|10|0|0|0]
[1|7|2|0|0|0]->11005.[2,475|374|10|0|0|0]
Loading file '/home/horea/Documents/qt_projects/build-Hazard01-Desktop-Release/H55_HI... Plain Text Tab Width: 8 Ln 91, Col 55 INS
```

**H55\_HIST\_04.YYYY-MM-DD.txt**

**The first row:**

- +the horizon identification**

- +number of sets in horizon**

- +the success hit statistic for the intersection**

**length: [2 | 3 | 4 | 5 | 6 | -]**

**The second row:**

- +The success hit neighbours for set 5**

**The third row:**

- +The all neighbours for set 5**

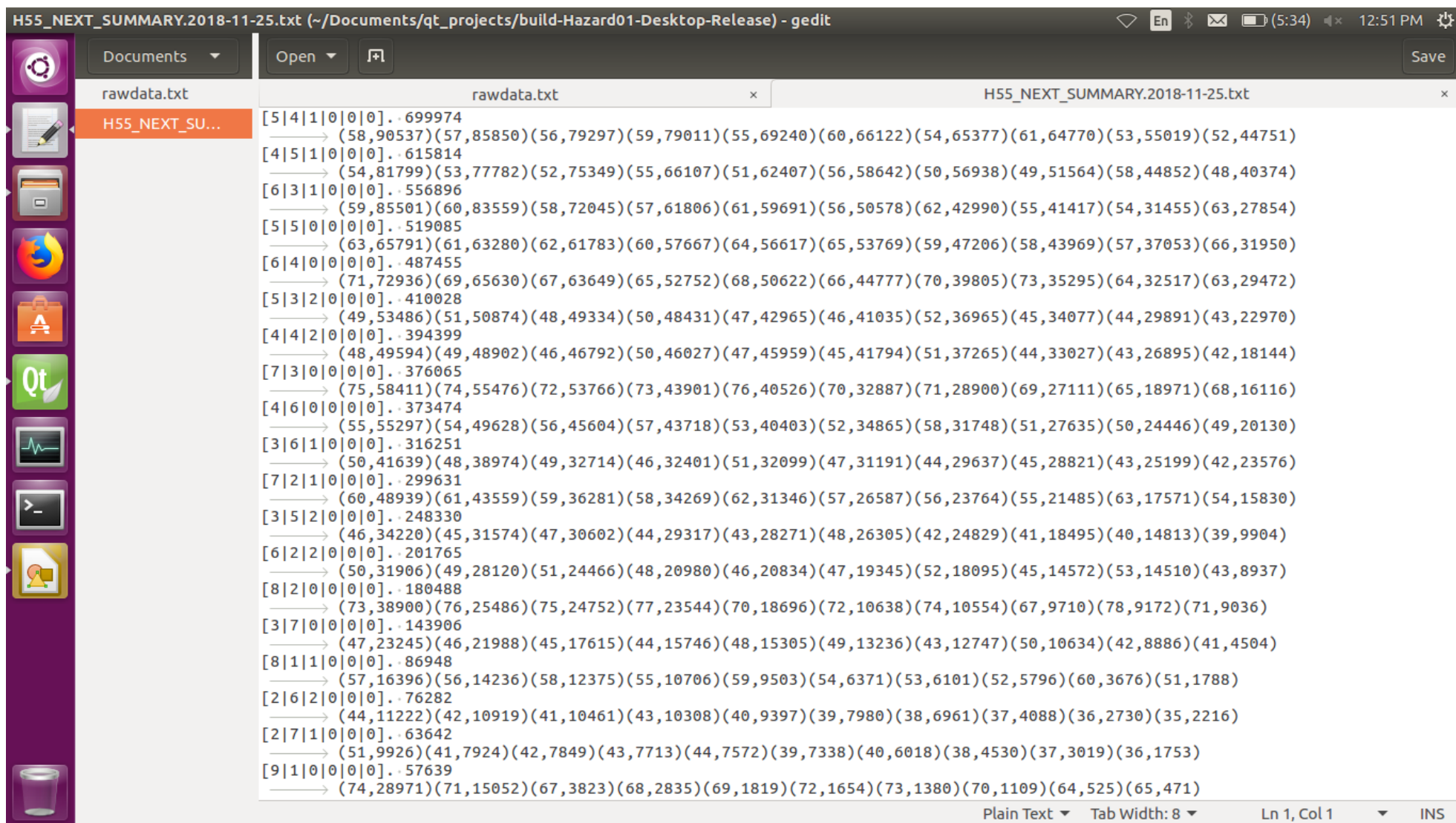
**The fourth row:**

- +The success hit neighbours for set 6**

**The fifth row:**

- +The firsts 10 neighbours for set 6**

# H55\_NEXT\_SUMMARY.YYYY-MM-DD.txt



```
H55_NEXT_SUMMARY.2018-11-25.txt (~/Documents/qt_projects/build-Hazard01-Desktop-Release) - gedit
Documents
Open
rawdata.txt
H55_NEXT_SU...
[5|4|1|0|0|0]. 699974
  (58,90537)(57,85850)(56,79297)(59,79011)(55,69240)(60,66122)(54,65377)(61,64770)(53,55019)(52,44751)
[4|5|1|0|0|0]. 615814
  (54,81799)(53,77782)(52,75349)(55,66107)(51,62407)(56,58642)(50,56938)(49,51564)(58,44852)(48,40374)
[6|3|1|0|0|0]. 556896
  (59,85501)(60,83559)(58,72045)(57,61806)(61,59691)(56,50578)(62,42990)(55,41417)(54,31455)(63,27854)
[5|5|0|0|0|0]. 519085
  (63,65791)(61,63280)(62,61783)(60,57667)(64,56617)(65,53769)(59,47206)(58,43969)(57,37053)(66,31950)
[6|4|0|0|0|0]. 487455
  (71,72936)(69,65630)(67,63649)(65,52752)(68,50622)(66,44777)(70,39805)(73,35295)(64,32517)(63,29472)
[5|3|2|0|0|0]. 410028
  (49,53486)(51,50874)(48,49334)(50,48431)(47,42965)(46,41035)(52,36965)(45,34077)(44,29891)(43,22970)
[4|4|2|0|0|0]. 394399
  (48,49594)(49,48902)(46,46792)(50,46027)(47,45959)(45,41794)(51,37265)(44,33027)(43,26895)(42,18144)
[7|3|0|0|0|0]. 376065
  (75,58411)(74,55476)(72,53766)(73,43901)(76,40526)(70,32887)(71,28900)(69,27111)(65,18971)(68,16116)
[4|6|0|0|0|0]. 373474
  (55,55297)(54,49628)(56,45604)(57,43718)(53,40403)(52,34865)(58,31748)(51,27635)(50,24446)(49,20130)
[3|6|1|0|0|0]. 316251
  (50,41639)(48,38974)(49,32714)(46,32401)(51,32099)(47,31191)(44,29637)(45,28821)(43,25199)(42,23576)
[7|2|1|0|0|0]. 299631
  (60,48939)(61,43559)(59,36281)(58,34269)(62,31346)(57,26587)(56,23764)(55,21485)(63,17571)(54,15830)
[3|5|2|0|0|0]. 248330
  (46,34220)(45,31574)(47,30602)(44,29317)(43,28271)(48,26305)(42,24829)(41,18495)(40,14813)(39,9904)
[6|2|2|0|0|0]. 201765
  (50,31906)(49,28120)(51,24466)(48,20980)(46,20834)(47,19345)(52,18095)(45,14572)(53,14510)(43,8937)
[8|2|0|0|0|0]. 180488
  (73,38900)(76,25486)(75,24752)(77,23544)(70,18696)(72,10638)(74,10554)(67,9710)(78,9172)(71,9036)
[3|7|0|0|0|0]. 143906
  (47,23245)(46,21988)(45,17615)(44,15746)(48,15305)(49,13236)(43,12747)(50,10634)(42,8886)(41,4504)
[8|1|1|0|0|0]. 86948
  (57,16396)(56,14236)(58,12375)(55,10706)(59,9503)(54,6371)(53,6101)(52,5796)(60,3676)(51,1788)
[2|6|2|0|0|0]. 76282
  (44,11222)(42,10919)(41,10461)(43,10308)(40,9397)(39,7980)(38,6961)(37,4088)(36,2730)(35,2216)
[2|7|1|0|0|0]. 63642
  (51,9926)(41,7924)(42,7849)(43,7713)(44,7572)(39,7338)(40,6018)(38,4530)(37,3019)(36,1753)
[9|1|0|0|0|0]. 57639
  (74,28971)(71,15052)(67,3823)(68,2835)(69,1819)(72,1654)(73,1380)(70,1109)(64,525)(65,471)
Plain Text Tab Width: 8 Ln 1, Col 1 INS
```

**H55\_NEXT\_SUMMARY.YYYY-MM-DD.txt**

**+It is an enumeration of all horizons**

**The first row:**

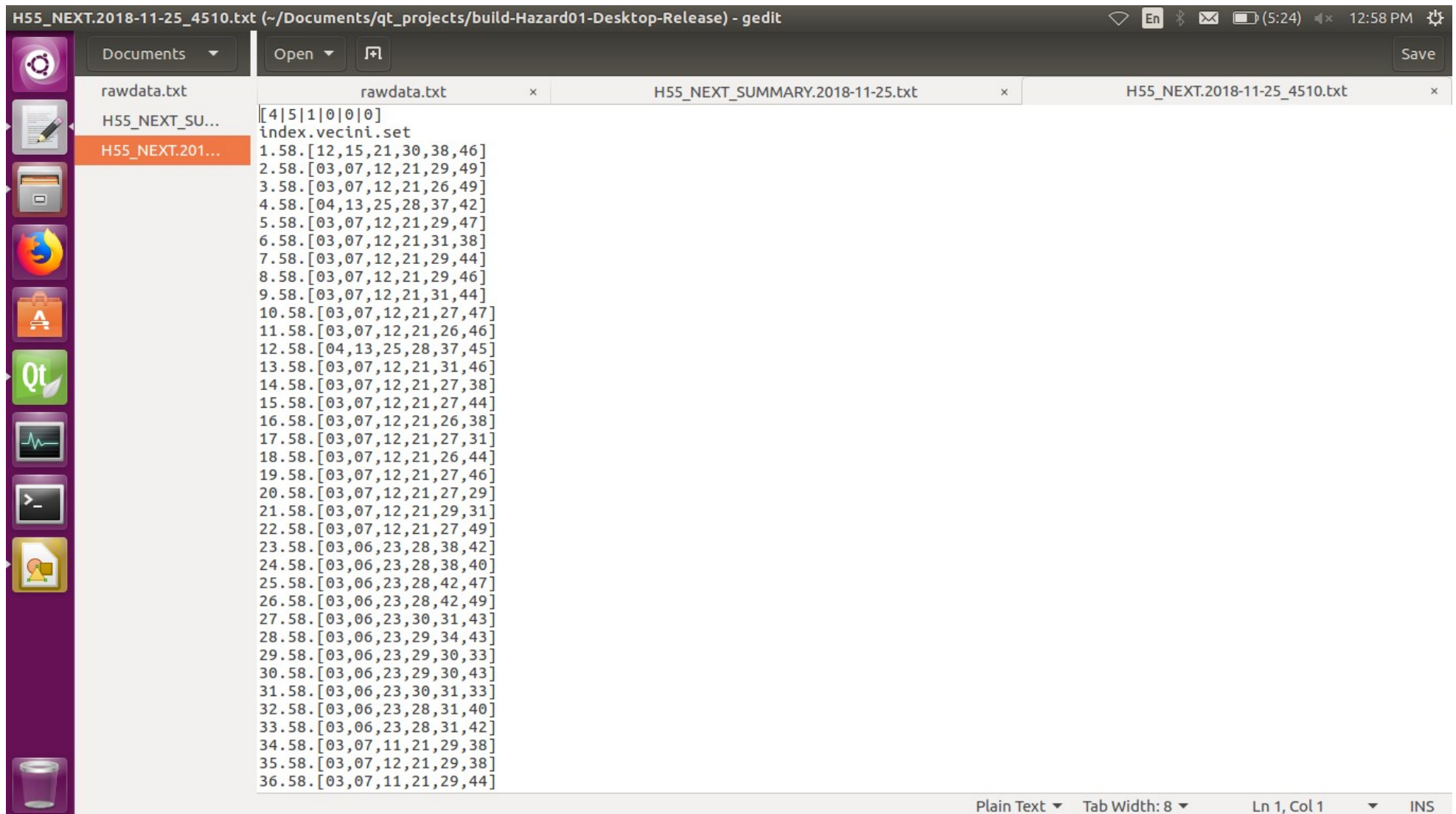
**+horizon identification**

**+the number of sets in horizon**

**The second row:**

**+The neighbours intersection**

# H55\_NEXT.YYYY-MM-DD\_4510.txt



The screenshot shows a gedit text editor window titled "H55\_NEXT.2018-11-25\_4510.txt (~/.Documents/qt\_projects/build-Hazard01-Desktop-Release) - gedit". The window has a sidebar on the left with a file manager view showing a list of files: "rawdata.txt", "H55\_NEXT\_SU...", and "H55\_NEXT.201...". The main editing area displays the content of "rawdata.txt", which is a list of 36 entries, each consisting of a timestamp followed by a list of numbers in square brackets. The entries are as follows:

```
[4|5|1|0|0|0]
index.vecini.set
1.58.[12,15,21,30,38,46]
2.58.[03,07,12,21,29,49]
3.58.[03,07,12,21,26,49]
4.58.[04,13,25,28,37,42]
5.58.[03,07,12,21,29,47]
6.58.[03,07,12,21,31,38]
7.58.[03,07,12,21,29,44]
8.58.[03,07,12,21,29,46]
9.58.[03,07,12,21,31,44]
10.58.[03,07,12,21,27,47]
11.58.[03,07,12,21,26,46]
12.58.[04,13,25,28,37,45]
13.58.[03,07,12,21,31,46]
14.58.[03,07,12,21,27,38]
15.58.[03,07,12,21,27,44]
16.58.[03,07,12,21,26,38]
17.58.[03,07,12,21,27,31]
18.58.[03,07,12,21,26,44]
19.58.[03,07,12,21,27,46]
20.58.[03,07,12,21,27,29]
21.58.[03,07,12,21,29,31]
22.58.[03,07,12,21,27,49]
23.58.[03,06,23,28,38,42]
24.58.[03,06,23,28,38,40]
25.58.[03,06,23,28,42,47]
26.58.[03,06,23,28,42,49]
27.58.[03,06,23,30,31,43]
28.58.[03,06,23,29,34,43]
29.58.[03,06,23,29,30,33]
30.58.[03,06,23,29,30,43]
31.58.[03,06,23,30,31,33]
32.58.[03,06,23,28,31,40]
33.58.[03,06,23,28,31,42]
34.58.[03,07,11,21,29,38]
35.58.[03,07,12,21,29,38]
36.58.[03,07,11,21,29,44]
```

The status bar at the bottom indicates "Plain Text", "Tab Width: 8", "Ln 1, Col 1", and "INS".



**H55\_NEXT.YYYY-MM-DD\_4510.txt**  
**Current Index.Neighbours.Set**

## **How to play:**

- +Rawdata.txt is in the same dir with app and has at least 10-11 sets.**
- +Run app**
- +Check the summary file (H55\_NEXT\_SUMMARY...) and pick-up an horizon. Usually an horizon from top like 451. For the chose horizon select a neighbour.**
- +Check the detailed file H55\_NEXT\_...\_4510.txt for the selected horizon**
- +Pick-up some sets corresponding to the neighbour.**
- +running the app with a parameter: Hazard a, makes the analysis for all the sets from rawdata.txt file. Can take a long time.**