Statistischer-Basistest PRG310 XOR3 (PTG.2) IBB, 14.04.2014

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Basic statistical test of bit sequences
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Date/Time: 10.01.2013,18:13 hour

file:   txor31.rnd  size:    10240000 Bytes

Test of null-hypothesis:
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Bit stream ist a stream of truly randomly
drawn number 0,1 with same probability p = 0.5

Non-overlapping byte count:

00      40336  39931  39764  39809  40107  39879  40157  40378
08      40248  40361  39881  39910  39831  39891  40005  39823
10      40152  40214  40056  39587  39719  39515  39719  39794
18      40246  40438  40020  39906  40047  40053  39994  39912
20      39932  40233  40032  39759  40066  40145  39638  40388
28      40120  40528  39787  39978  40167  39804  39773  39924
30      40150  40118  40098  39973  39893  39661  40020  39990
38      39957  40012  39538  39788  39457  39934  39737  40201
40      40063  39660  40047  39783  40202  40249  40030  39941
48      40118  39776  39987  40407  40423  39643  40329  40118
50      39965  39999  40072  40348  40233  40006  39927  39731
58      40023  40323  40107  39791  40246  40074  39695  39852
60      40229  40006  40157  40063  40256  40027  40401  40177
68      39939  39908  39778  39637  40113  39998  39783  40326
70      39927  40078  39989  39706  40174  39993  39584  40215
78      39739  39750  40005  40007  40027  39918  40000  39853
80      40025  39690  40201  39769  40133  39985  39851  39934
88      40048  39920  40086  39860  39832  40062  39936  39794
90      40318  39896  40259  40136  40032  39848  40071  39969
98      39854  40090  40254  39636  39872  40396  40109  40288
a0      40170  40114  39943  39948  40227  40045  40087  39839
a8      39900  39793  39897  39870  39963  39841  40249  39932
b0      39963  39837  39984  40159  39964  39764  39768  40024
b8      40009  40165  39992  40134  39622  40003  40004  39786
c0      40249  40138  39942  39769  40128  40102  40137  39981
c8      39871  40051  40108  40271  39939  39861  40140  39746
d0      39862  40207  40321  40098  40077  39891  40222  39976
d8      40214  40013  39796  39759  40005  40068  40297  40041
e0      40087  40096  39795  39907  40001  40004  39893  39863
e8      40131  39859  40009  39923  40387  40240  39772  40142
f0      40022  39975  39517  40120  39777  40274  39932  40115
f8      40197  39827  40276  40039  40152  39947  39893  39983

Evaluation of count of   10240000 Bytes =    81920000 Bits:

  Theoretical average of byte-frequencies: 40000
  '3c' = 39457 (minimum)    '29' = 40528 (maximum)

  Theoretical interval I of byte-frequencies:
  I = (39609 to 40391) (for 95 % of 256 frequency)

Test 1:
  The theoretical permissible number of the 5% outliers (average 13)
  from the interval I is between 6 and 20

  The real number of the outliers from interval I:
  smaller: 6  greater: 6  summary: 12

Test 2:
  Evaluation of byte-frequencies
  Chi-square non-overlapping:
  Theoretical maximum chi-square = 293.25
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  Chi-square value               = 244.14

  Chi-square overlapping:
  Theoretical maximum chi-square = 155.40
  Chi-square value               = 153.62

Test 3:
  r = 0.49990565 (relative frequency of bit 1 in the bit stream)

  For a truly random sequence, the probability for r to have values in the
  complement of the open interval (0.49990565 , 0.50009435) is w = 0.08763766.
  If w is very small (e.g., w < 0.05), the null-hypothesis is rejected.
  If more sequences can be tested, the probability w has to be >= 0.05
  for about 95% of the tested bit sequences.

Test 4:
  Frequencies of overlapping 2-tuples:
  tuples 00:   20488614     tuples 01:   20479116
  tuples 10:   20479115     tuples 11:   20473155

  Check size: Chi-square of 2-bit patterns minus chi square of 1-bit patterns
  Theoretical maximum chi-square = 5.99
  Chi-square value               = 3.07

Test 5:
  Frequencies of 2-tuples on even places:
  tuples 00:   10243019     tuples 01:   10242826
  tuples 10:   10238865     tuples 11:   10235290

  Theoretical maximum chi-square = 7.81
  Chi-square value               = 3.96

Test 6:
  Frequencies of 2-tuples on odd places:
  tuples 00:   10245595     tuples 01:   10236290
  tuples 10:   10240250     tuples 11:   10237865

  Theoretical maximum chi-square = 7.81
  Chi-square value               = 4.85

Result of statistical analysis of file   txor31.rnd:
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The tests: 1 2 3 4 5 6  were fulfilled!

The null-hypothesis is accepted!
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