# 统计计算第四次作业

Code

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# 题目要求

在游程题目条件下看统计量$\Sigma_{i=1}^{6}\frac{(g_i-nb_i)^2}{nb_i}$是不是服从自由度为5的卡方分布。

# 解答

总体分布的卡方检验的原假设是随机数来自于均匀主体，统计样本的实际频数的差异越大说明观测样本的总体分布与理论分布差异越大。上述统计量的卡方检验结果为0.025，显著拒绝原假设，所以不服自由度为5的卡方分布。相比pdf中，这个统计量的主要区别是a，a起到了调节权重的作用。但总体来说至少这个统计量中nb和g存在差距。

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```
N = 1000
b = c(1/6,5/24,11/120,19/720,29/5040,1/840)
res <- NULL
G <- matrix(0,nrow = 1000,ncol=6)
for (i in 1:1000){
  data = runif(N)
  beg_stop = 1
  for(j in 1:(N-1)){
    if(data[j+1]<data[j])
      beg_stop=c(beg_stop,j+1)
  }
  beg_stop=c(beg_stop,N+1)
  end=length(beg_stop)
  runs <- beg_stop[2:end] -beg_stop[1:(end-1)]
  G[i,] = c(sum(runs==1),sum(runs==2),sum(runs==3),sum(runs==4),sum(runs==5),sum(runs
==6))
  stat = sum(((G[i,]-N*b)%*%t(c(1,1,1,1,1,1)))*(c(1,1,1,1,1,1)%*%t(G[i,]-N*b))/(N*b))
  res[i] <- stat>qchisq(0.95,5)
}
mean(res)
```

```
[1] 0.025
```

打印g值查看，计算比率后发现游程为1的数量算是在nb=166左右，感觉是a在统计量构建中起了比较大的作用。

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```
G
```

```
      [,1] [,2] [,3] [,4] [,5] [,6]
 [1,]  169  203   91   28    8    0
 [2,]  152  196  108   28    4    0
 [3,]  159  226   83   25    8    0
 [4,]  168  207   98   19    6    3
 [5,]  161  189  100   27    8    1
 [6,]  173  204   84   28   11    0
 [7,]  151  203   85   33   10    1
 [8,]  173  191   94   29    7    2
 [9,]  157  223   95   19    6    1
[10,]  176  203   94   24    8    0
[11,]  147  211  100   20    9    1
[12,]  169  215   91   25    2    3
[13,]  173  216   87   26    6    0
[14,]  157  209  104   23    3    1
[15,]  200  213   79   23    9    0
[16,]  178  220   82   21    8    2
[17,]  159  215   92   25    7    0
[18,]  156  213   85   29    8    0
[19,]  162  210   90   24    8    2
[20,]  158  220   89   30    3    0
[21,]  174  205  100   24    4    0
[22,]  162  214   84   32    6    0
[23,]  179  238   84   17    5    0
[24,]  171  208   89   21   10    2
[25,]  161  210  100   22    5    1
[26,]  176  194   97   27    5    2
[27,]  170  217   92   25    4    0
[28,]  164  216   88   26    6    1
[29,]  181  191  106   21    7    0
[30,]  192  197  100   21    6    0
[31,]  148  195   94   32    8    2
[32,]  167  194  103   22    8    0
[33,]  175  202   97   30    2    0
[34,]  148  198  104   27    6    1
[35,]  169  204   86   31    7    1
[36,]  164  202   87   29   11    0
[37,]  178  201   88   32    3    1
[38,]  173  214  102   13    7    1
[39,]  156  221   81   23    6    5
[40,]  153  206   98   30    3    1
[41,]  166  213   91   25    7    0
[42,]  155  206  111   17    5    0
[43,]  176  214   85   25    7    1
[44,]  176  213   87   22    6    2
[45,]  146  213  100   27    4    0
[46,]  169  175  105   35    4    1
[47,]  187  202   88   22    9    2
[48,]  165  226   75   33    4    1
[49,]  157  221   81   28    8    1
[50,]  176  211  100   20    2    2
[51,]  149  216   93   26    6    1
[52,]  185  227   85   18    3    2
[53,]  171  211   89   31    2    1
[54,]  164  218   92   26    4    0
[55,]  164  187   94   34    6    0
[56,]  180  221   88   23    2    2
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  [57,]  160  208   99   21    6    1
  [58,]  153  200   92   35    5    1
  [59,]  181  215   91   20    6    1
  [60,]  184  202   80   35    4    2
  [61,]  164  225   90   20    6    1
  [62,]  186  242   75   20    5    0
  [63,]  152  213   93   27    7    0
  [64,]  188  195   91   27    7    1
  [65,]  151  210   92   33    3    1
  [66,]  173  209   88   30    5    0
  [67,]  178  219   91   20    5    1
  [68,]  162  201  102   26    4    1
  [69,]  176  199   94   31    4    0
  [70,]  173  209   93   25    6    0
  [71,]  161  187  105   26    8    1
  [72,]  154  215   88   25    8    2
  [73,]  183  209   76   31    7    2
  [74,]  175  208   85   31    6    0
  [75,]  160  211   95   26    3    1
  [76,]  167  210   90   25    5    3
  [77,]  178  210   91   24    3    3
  [78,]  161  197   86   35    7    2
  [79,]  157  203   99   25    4    2
  [80,]  172  206   92   31    2    1
  [81,]  154  209  100   23    6    1
  [82,]  161  215   75   33    8    2
  [83,]  151  223   86   29    3    1
  [84,]  166  221   82   26    2    3
  [85,]  171  205   91   27    5    1
  [86,]  154  200   90   31    8    2
  [87,]  162  204   93   21   11    2
  [88,]  164  192   93   32    9    0
  [89,]  146  209   92   35    4    0
  [90,]  168  210   95   26    2    1
  [91,]  152  209   90   30    8    0
  [92,]  169  216   79   33    6    0
  [93,]  159  213   92   27    5    1
  [94,]  174  208  100   25    2    0
  [95,]  164  227   86   27    2    1
  [96,]  157  206   89   32    6    1
  [97,]  154  229   86   25    6    0
  [98,]  177  212   92   22    7    0
  [99,]  162  214   97   22    5    1
 [100,]  183  204   99   23    4    0
 [101,]  165  200  101   28    4    0
 [102,]  168  202   93   23    9    2
 [103,]  148  216   81   30    9    2
 [104,]  158  227   91   20    7    0
 [105,]  176  209   82   35    4    0
 [106,]  184  190   88   26   10    3
 [107,]  161  221   85   26    4    3
 [108,]  157  204   93   26    9    0
 [109,]  192  220   85   23    3    1
 [110,]  161  224   88   29    1    1
 [111,]  163  196  100   26    7    1
 [112,]  169  197   82   35    9    1
 [113,]  191  187  100   27    3    2
 [114,]  167  213   98   24    2    0
```

```
[115,]  155  228   88   20    9    0
[116,]  161  216   99   18    5    1
[117,]  161  203  104   25    3    1
[118,]  164  212   90   28    6    0
[119,]  171  212   89   24    6    2
[120,]  151  213   87   34    4    1
[121,]  173  187  106   26    5    1
[122,]  161  230   93   20    4    0
[123,]  176  180  108   23    6    3
[124,]  200  179   96   32    4    1
[125,]  168  199   88   30    5    3
[126,]  161  212   98   25    3    1
[127,]  174  217   92   19    8    0
[128,]  172  188   99   31    5    1
[129,]  174  202   82   30   10    1
[130,]  159  213   89   32    4    0
[131,]  174  193  104   27    4    0
[132,]  155  216   95   28    2    1
[133,]  171  211   92   25    5    1
[134,]  180  220   92   17    6    1
[135,]  159  187   96   36    7    0
[136,]  170  193   81   38    6    2
[137,]  166  195  100   27    6    1
[138,]  166  227   82   22    8    1
[139,]  179  222   91   17    6    1
[140,]  155  216   95   24    4    2
[141,]  161  207   93   26    6    2
[142,]  179  212   92   22    3    3
[143,]  177  204   90   26    7    1
[144,]  175  205   92   22    9    1
[145,]  175  222   84   27    3    1
[146,]  190  212   91   22    5    0
[147,]  159  205   91   33    4    1
[148,]  150  201   92   34    6    1
[149,]  157  216   87   26    8    1
[150,]  175  200   94   25    6    1
[151,]  157  240   75   28    4    1
[152,]  182  201  100   24    4    0
[153,]  158  222   93   26    3    0
[154,]  148  227   96   25    2    0
[155,]  165  225   86   24    5    1
[156,]  178  195   91   36    3    0
[157,]  151  222   91   29    2    1
[158,]  164  206   85   27   11    1
[159,]  163  206   91   30    5    0
[160,]  164  212   91   23    7    2
[161,]  158  212  101   25    3    0
[162,]  165  212   94   24    3    3
[163,]  181  194   95   27    5    1
[164,]  156  199  101   27    7    0
[165,]  174  209   84   22   10    3
[166,]  148  225   82   30    6    1
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