```
/*
          GetInter.cpp
                                                         */
/*
           Hui Jin
                                                         */
/*
  file description:
      Get appropriate permutation for LDGM (LDPC) code for given
      degree sequence L and R.
      In first version. R sequence is constant.
  Author: Hui Jin
         3/12/2000
  date:
  modification: 3/12/2000
                           first version.
                           One important thing is, L and R should
be
                           in decreasing order.
                4/5/2000
                           Second version. Leave GetInter() there.
                           implement new version newGetInter()
using
                           Gallager idea, similar to his ensemble
but has
                           variable and check nodes reversed. See
page 38
                           Book III.
                4/9/2000
                           Method II has problems, return to
GetInter(),
                           but change the way the next number is
                           generated.
                             L and R should be
                           in decreasing order !!!!
                           And we should use the same .prm in
IRAsimu.
                4/12/2000
                           We are going to arrange the degree 2
nodes on
                           the left, because those are causing
problems of
                           short cycles in decoding.
                           The main idea is to arrange them as a
path on
                           nodes 0, t, 2t, 3t, ... (n-1)t, where t
is an
                           integer that gcd(t,n)=1, and t is around
                           sqrt(n). So this is like the right part
except
                           in different order.
                           In this way, We can make sure the
                           shortest cycle consisting only degree 2
node is
                           around 2t. Which is good.
                           Degree sequence is still in decreasing
```



```
order,
                               but we take care of degree 2 nodes
first. The
                               rest the same as 4/9/2000 version.
*/
#include <iostream.h>
#include <fstream.h>
#include <stdlib.h>
#include <math.h>
#include "vector.h"
#include "ldpc.h"
#include "paramfio.h"
#include "datatype.hh"
#include "random.hh"
void printusage()
        printf("Usage: GetInter filename.prm infolen \n");
        exit(1);
}
void getLRdegree(degree_sequence& L, degree_sequence &R, char *
filename)
        ivector deg;
        vector fe;
        paramfio P;
        P.set_filename(filename);
        P.read("variable degree", deg);
        P.read("variable fraction", fe);
        L.init(deg.getsize());
        L.d = deg;
        L.fe = fe;
        P.read("check degree", deg);
        P.read("check fraction", fe);
        R.init(deg.getsize());
        R.d = deg;
        R.fe = fe;
        L.edge_to_node();
        R.edge_to_node();
}
```



```
/*
delete the index term from a list with length=len.
  index is in [0, len-1].
*/
void list_del(int list[], int len, int index)
  for(int i=index; i<len-1; i++)</pre>
     list[i]=list[i+1];
}
/*
3/12/2000
            Hui Jin
get an interleaver for LDGM code.
Any two edge in the same variable node won't be in the same check
garantee the second part by imposing if two edges are adjacent to the
variable node, their permutation must be with distance >=k, which can
adjacent to the same check node.
help function: void list_del(int list[], int len, int index)
                4/9/2000
modification:
        only check distance property in the same node.
*/
void getInter(int *_interleaver, degree_sequence & LV, int nv[], int
_len, int check_deg)
   //how many numbers left in the pool.
   int remain_len = _len;
   int k=0;
   int distance:
   int s_ch;
   //the set of all the numbers.
   int list[_len];
   int list index;
   for(int m=0; m< _len; m++) list[m]=m;</pre>
   RandomGenerator rand;
   for(int i=0; i< LV.n; i++)
      for(int l=0; l< nv[i]; l++)
         for(int j=0; j<LV.d[i]; j++)
           {
           //randomly get a number in the remaining numbers.
           list_index = (int) floor(rand.UNI()*remain_len);
```



```
_interleaver[k]=list[list_index];
          distance=2*check deg;
           //check if all the close positions have a permutation with
           // appropriate distance.
          s_ch=k-j;
          while(s_ch<k)
            { //if degree 2 nodes, special care.
              if(LV.d[i]==2) distance = 200;
              if(abs(_interleaver[s_ch]-_interleaver[k])>= distance)
s_ch++;
              else
                   list_index = (int) floor(rand.UNI()*remain_len);
                   _interleaver[k]=list[list_index];
                   s_ch=k-j;
        //we found the appropriate number, now delete that element
from the
        // remain list.
        list_del(list, remain_len, list_index);
         remain_len--;
       }
}
int main(int argc, char* argv[])
        if (argc !=3)
                 printusage();
        }
        degree_sequence LV;
        degree_sequence LC;
        int argcount = 1;
        getLRdegree(LV, LC, argv[argcount++]);
        int info_len= atoi(argv[argcount++]);
```



```
int nv[LV.n];
        int LEdge_num=0;
        double s=0;
        for(int i=0; i< LV.n-1; i++)</pre>
              nv[i]= int(floor((s+LV.fn[i])*info_len) -
floor(s*info len));
              s+=LV.fn[i];
              LEdge_num += nv[i] * LV.d[i];
         nv[LV.n-1] = info_len -(int) floor(s*info_len);
         LEdge_num += nv[LV.n-1] * LV.d[LV.n-1];
        //assume here LC.av_degree() is constant
        int check_deg= (int) floor(LC. av_degree_node());
        int _len= LEdge_num;
        cout << "Total length permutation " << _len << endl;</pre>
        int _Interleaver[_len];
        getInter(_Interleaver, LV, nv, _len, check_deg);
        for(int i=0; i< _len; i++)
           cout << _Interleaver[i]<< endl;</pre>
```



}

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