

PROGRAMUL PRINCIPAL (EXEMPLU SBC MEDICAL)

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//include librariile
#include "stdio.h"
#include "stdlib.h"
#include "malloc.h"
#include "string.h"
#include "math.h"

//defineste variabilele
FILE *fp;
char x[30];
char y[30];
char z[30];
char q[30];
char s1[250];
char s2[250];
char s3[250];
char bests[250];
int i,j,k,ss,best, response, bestvar;
int ipot=0;
int evid=-1;
float *po, *rulevalue, *mini, *maxi;
int *questions, *var, *varflag;
float absolut, p, pp, af, py, pn, pe, rv, maxofmin, prior, a1, a2, a3,a4;

//punctul de start
void main(void)
{
    //deschide fisierul cu date, daca exista
    if ((fp=fopen("dataa.dat", "r"))==NULL)
    {
        printf("Cannot open file \n");
        exit(1);
    }
    rewind(fp);

    //citeste fisierul si calculeaza numarul total de boli si intrebari
    fscanf(fp, "%s",s1);
    fscanf(fp, "%s",s1);
    while (strcmp(s1, "symptoms")!=0)
    {
        fscanf (fp, "%s%s%s", x,z,y);
        while (strcmp(y,"999")!=0)
        {
            fscanf(fp, "%s%s%s", x,z,y);
        }
        ipot++;
        fscanf(fp,"%s",s1);
    }
    while (strcmp(s2, "end")!=0)
    {
        fscanf(fp, "%s%s", s2,s3);
        evid++;
    }
}
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//creaza liste cu pointer
po = (float*) malloc ((ipot+1)*sizeof(float));
rulevalue = (float*) malloc((evid+1)*sizeof(float));
questions = (int*) malloc ((ipot+1)*sizeof(int));
mini = (float*) malloc((ipot+1)*sizeof(float));
maxi = (float*) malloc((ipot+1)*sizeof(float));
var = (int*) malloc ((ipot+1)*sizeof(int));
varflag = (int*) malloc((evid+1)*sizeof(int));

if (!po || !rulevalue || !questions || !mini || !maxi || !var || !varflag)
{
    printf("Allocation failure\n");
    exit(1);
}

//initializeaza variabilele
for (j=1;j<=(evid+1);j++)
{
    varflag[j]=1;
    rulevalue[j]=0;
}

for (j=1;j<=(ipot+1);j++)
{
    mini[j]=0;
    maxi[j]=0;
    po[j]=0;
    questions[j]=0;
    var[j]=0;
}

//find the prior probability and rule values

j=0;
rewind(fp);
for (k=1;k<=ipot;k++) questions[k]=0;
fscanf(fp, "%s", s1);
for (i=1;i<=ipot;i++)
{
    fscanf(fp,"%s",s1);
    fscanf(fp,"%s%s%s", x,z,y);
    po[i]=(float) atof(z);
    p=po[i];
    j=atoi(y);
    k=0;
    while (strcmp(y,"999"))
    {
        fscanf (fp, "%s%s", x,z);
        py= (float) atof(x);
        pn= (float) atof(z);
        k++;
        rulevalue[j]+= (float) fabs(p*py/(p*py+(1-p)*pn)-p*(1-
py)/(p*(1-py)+(1-p)*(1-pn)));
        fscanf (fp, "%s",y);
        j=atoi(y);
    }
    var[i]=k;
}

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        questions[i]=k;
    }

//find the maximum symptom and query
do
{
    rv=0;
    bestvar=0;
    for (j=1;j<=evid;j++)
    {
        if (rulevalue[j]>rv)
        {
            bestvar=j;
            rv=rulevalue[j];
        }
        rulevalue[j]=0;
    }
    if (bestvar==0)
    {
        printf("\nNo further symptoms\n");
        exit(1);
        fclose(fp);
    }

    rewind (fp);
    fscanf (fp, "%s", s1);
    for (i=1;i<=ipot;i++)
    {
        fscanf(fp, "%s", s1);
        do {
            fscanf(fp, "%s%s%s", x,z,y);
        } while (strcmp(y,"999"));
    }
    fscanf(fp, "%s", s1);
    for (j=1;j<=bestvar;j++) fscanf(fp, "%s%s", s2,s3);
    printf("\nQuestions:\n");
    printf("%s", s3);
    varflag[bestvar]=0;

//obtain user response and adjust probability
printf("\nreply on a scale -5(no) to +5(yes)\n");
scanf ("%d", &response);
rewind(fp);
fscanf (fp, "%s", s1);
for (i=1;i<=ipot;i++)
{
    fscanf(fp, "%s", s1);
    for (k=1; k<=var[i];k++)
    {
        fscanf(fp,"%s%s%s",x,z,y);
        j=atoi(y);
        py= (float) atof(x);
        pn= (float) atof(z);
        if (j!=bestvar || questions[i]==0) continue;
        questions[i]--;
        p=po[i];
        pe=p*py+(1-p)*pn;
    }
}

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        if (response>0) po[i]=p*(1+(py/pe-1)*response/5);
        else po[i]=p*(1+(py-(1-py)*pe/(1-pe))*response/5);
        if (po[i]==floor(po[i])) questions[i]=0;
    }
    fscanf(fp,"%s%s%s",x,z,y);
}

//find new rule value and minimum and maximum probability
rewind(fp);
fscanf(fp,"%s",s1);
maxofmin=0;
best=0;
for (i=1;i<=ipot;i++)
{
    fscanf(fp,"%s",s1);
    fscanf(fp,"%s%s%s",x,z,y);
    prior=(float)atof(z);
    p=po[i];
    a1=1;
    a2=1;
    a3=1;
    a4=1;
    for (k=1;k<=var[i];k++)
    {
        fscanf(fp,"%s%s%s",x,z,y);
        j=atoi(y);
        py=(float)atof(x);
        pn=(float)atof(z);
        if (varflag[j]*questions[i]==0) continue;
        if (pn>py)
        {
            py=1-py;
            pn=1-pn;
        }
        rulevalue[j]+=(p*py/(p*py+(1-p)*pn)-p*(1-py)/(p*(1-
py)+(1-p)*(1-pn)));
        a1*=py;
        a2*=pn;
        a3*=(1-py);
        a4*=(1-pn);
    }
    maxi[i]=p*a1/(p*a1+(1-p)*a2);
    mini[i]=p*a3/(p*a3+(1-p)*a4);
    if (maxi[i]<prior)
    {
        questions[i]=0;
        printf("\nWe can ignore %s",s1);
    }
    if (mini[i]>maxofmin)
    {
        best=i;
        maxofmin=mini[i];
    }
}

//search for a clear winner
for (i=1;i<=ipot;i++)

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        if (mini[best]<=maxi[i] && i!=best)
            maxofmin=0;
    } while (maxofmin==0);

    rewind (fp);
    fscanf (fp, "%s", s1);
    for (i=1;i<=best;i++)
    {
        fscanf(fp, "%s", bests);
        for (k=1; k<=var[i];k++)
        {
            fscanf(fp, "%s%s%s", x,z,y);
        }
        fscanf(fp, "%s%s%s", x,z,y);
    }

    printf("\n\n The most likely outcome is %s", bests);
    printf("\n with a probability %f", po[best]);
    fclose(fp);
    free(po);
    free(rulevalue);
    free(questions);
    free(mini);
    free(maxi);
    free(var);
    free(varflag);

    scanf("%d", &response);
}

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FISIERUL DATAA.DAT

```

illeneses
common_cold
1.0 .01 7
1.0 .01 2
1.0 .01 6
1.0 .01 16
1.0 .01 7
1.0 .01 16
0.0 .5 8
0.0 .01 64
1.0 .01 15
1.0 .01 17
0.0 .01 999
laryngitis
1.0 .01 8
1.0 .01 34
1.0 .01 12
1.0 .01 15
1.0 .01 18
1.0 .01 31
1.0 .01 22
1.0 .01 12
1.0 .01 22
1.0 .01 36
1.0 .01 23

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1.0 .01 5
1.0 .01 5
1.0 .01 18
1.0 .01 23
1.0 .01 29
1.0 .9 7
1.0 .01 18
1.0 .01 999

symptoms

1

are-you-sneezing-a-lot?

2

are-you-eyes-painful-or-waterin-a-lot?

3

do-you-have-a-sore-throat?

4

is-your-voice-hoarse?

5

are-you-coughing-a-lot?

6

do-you-have-a-runny-nose?

7

do-you-have-a-headache-or-in-general-do-you-sufer-from-headaches-at-all?

8

do-you-have-a-high-temperature?

9

do-you-spend-a-lot-of-your-time-in-a-very-dusty-atmosphere?

10

dose-your-skin-itch?

11

do-you-have-a-dry-throat?

12

is-your-breath-'wheezy'?

13

is-your-nose-very-'blocked-up'?

14

have-you-had-a-cold-or-similar-infection-recently?

15

do-you-fell-generally-ill?

16

do-you-have-trouble-swallowing?

17

do-you-muscles-ache?

18

do-you-have-any-pain-at-all-in-your-chest?

19

have-you-had-your-tonsils-removed?

20

do-you-have-any-symptoms-which-tend-to-occur-in-'attacks'-rather-than-being-present-all-the-time?

21

do-you-have-a-'productive'-cough-a-cough-in-which-you-bring-something-up?

22

are-you-rather-breathless?

23

do-you-sweat-a-lot-not-just-when-you-exert-yourself-but-when-you-are-apparently-relaxing-as-well?

24

is-your-pulse-rate-high-?normally-it-should-be-about-60-to-80-beats-each-minute-and-slight-faster-for-people-over-70-or-under-20

25

do-you-have-severe-attacks-of-breathlessness-enough-to-seriously-worry-you?

26

does-your-skin-have-a-bluish-tinge?

27

when-you-cough-is-your-phlegm-stained-with-blood?

28

are-you-confused-muddled-about-what's-going-on-around-you?

29

are-you-(or-the-patient)-delirious-talking-incoherently-with-poor-muscular-coordination?

30

do-you-have-a-dry-(non-productive)-cough?

31

is-it-painful-when-you-breathe-or-cough?

32

do-you-ever-have-any-really-severe-pain-in-your-chest?

33

do-you-swing-between-feeling-chilled-and-feeling-feverish?

34

do-you-have-any-symptoms-which-have-been-present-for-some-time-possibly-six-weeks-or-more?

35

do-you-have-'clubbed-fingers'?-these-are-fingers-in-which-the-cuticles-have-almost-disappeared-and-nails-curve-over-at-the-fingertips?

36

do-you-have-any-symptoms-which-mainly-occur-when-you-exert-yourself?

37

do-you-smoke?-to-reply-divide-the-number-of-cigarettes-you-smoke-by-5-use-this-number-to-reply-(if-you-smoke-20-a-day-reply-4).5-is-the-maximum-reply-and--5-means-you-do-not-smoke.

38

do-you-suffer-from-feelings-of-dizziness?

39

do-you-have-palpitations?-the-feeling-that-your-heart-is-beating-more-strongly-or-faster-or-more-unevenly-than-it-should?

40

is-either-your-ankles-unduly-swollen?

41

are-you-vomiting-or-do-you-have-strong-feelings-of-nausea?

42

do-you-have-any-abdominal-pain?-this-is-pain-anywhere-between-the-bottom-of-the-tibcage-and-the-groin?

43

do-you-suffer-from-disapchoea?-passing-unusually-runny-feeces?

44

have-you-your-appendix-removed?

45

do-you-have-jaundice?-this-is-not-a-disease-but-a-simptom-of-disease,-often-it-is-more-obvious-in-the-eyes-the-wthites-become-yellow?

46

are-you-rather-tense-and-apprehensive?

47

do-you-find-it-hard-to-get-to-sleep-or-do-you-often-wake-in-the-middle-of-the-night?
48
do-you-have-any-involuntar-twitching-or-trembling?
49
do-you-suffer-from-constipation?-passing-faeces-infrequently-or-with-difficulty.
50
do-you-have-a-poor-memory?-that-is-difficulty-remmembering-individual-facts-either-occasionally-or-regularly?
51
have-you-totally-or-nearly-lost-the-power-of-speech?
52
have-you-experienced-any-bleeding-from-your-back-passage?
53
are-you-male-or--female?-answer-5-for-male-or--5-for-female.-if-you'd-like--the-analysis-to-be-general (for-either-sex) -reply-0.
54
is-your--neck-stiff-and/or-painful?
55
have-you-sustained-any-kind-of-had-injury-over-the-last-few-weeks?-even-a-very-slight-injury-can-be-important
56
have-you-recently-been-passing-abnormal-looking-faeces?
57
are-you-passing-large-quattities-wind-either-by-belching-orflatulence?
58
do-you-have-sudden-feeling-of-faintness-feeling-weak-and-unsteady-maybe-even-losing-counciousness?
59
does-any-part-of-your-body-itch-with-or-without-the-presence-of-any-rash?
60
do-you-have-a-skin-rash-of-any-sort?
61
is-any-part-of-your-numb-or-do-you-have-tingling-'pins-and-needles'-sensation-anywhere?
62
are-you-overweight-or-underweight?-reply-5-for-definitive-overweight-and-5-for-definite-underweight.-reply-0-if-your-weigth-is-just-rigth.
63
do-you-have-any-pain-in-your-face-or-forehead?
64
do-you-have-any-swelling-under-the-skin?
65
is-your-urine-abnormaly-coloured?
66
are-you-urinating-unusually-frequently?
67
is-it-painful-when-you-urinate?
68
is-your-vision-impaired-in-any-way-blurring-or-double-vision-or-seeing-flashing-lights?- (this-does-not-include-defects-which-can-be-corrected-by-spectacles) .
end
end