



CLINICAL DECISION SUPPORT SYSTEMS FOR CANCER MANAGEMENT

Exsys CORVID Software

By

KEERTHANA T

Department of Biomedical Informatics

Rutgers University - School of Health Professions

Piscataway, NJ


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Professor: Dr. Dinesh P. Mital

1. DEFINING VARIABLES

Static variables

 Variables

NewCopy

Static List

Treatment
Type_of_cancer
Biochemical_markers
Signs_and_Symptoms
Blood_in_the_stool
Heartburn_or_Indigestion
Fatigue
Fever
Long_Term_Sore_Throat
Unusual_Vaginal_Bleeding
Breast_Changes
Testicle_Changes
Trouble_Swallowing
Swollen_Lymph_Nodes
Problem_during_urination
Bloating_issues
Nagging_cough
Changes_in_skin
Loss_of_appetite
Unexplained_weight_loss

Dynamic List

Edit NameDeleteWhere

Limit to Variables Containing:

Update

Sort

☐ Alphabetically
☐ Order Created
☒ By Variable Type
☐ By Type + Alpha

Question Defaults

Preview All

Import

Numeric variables

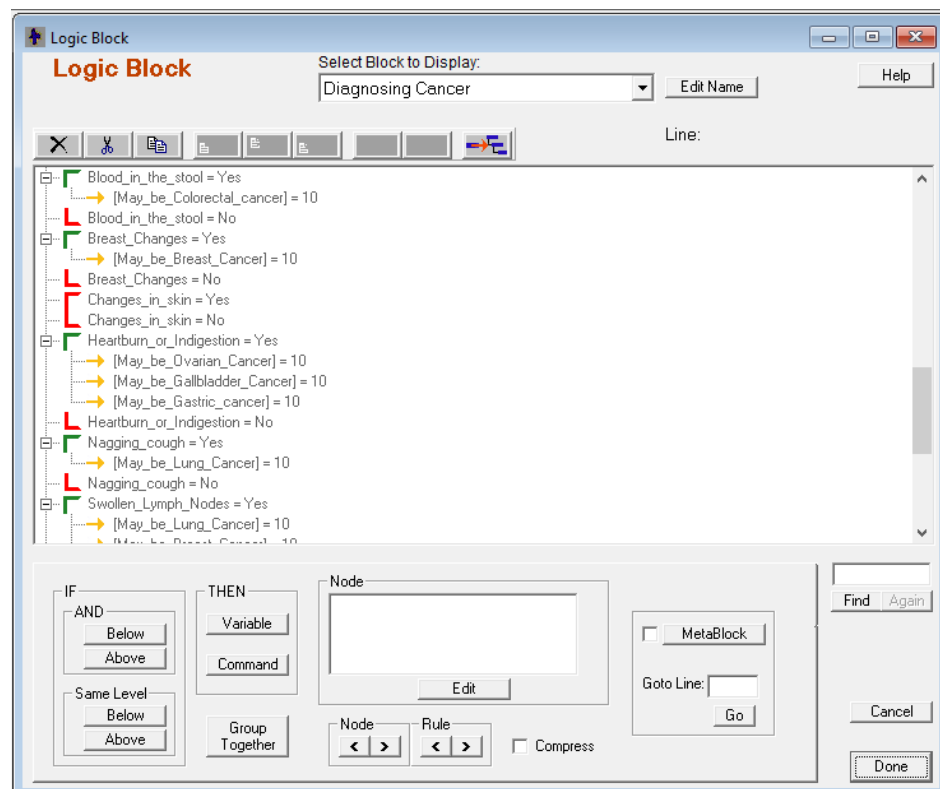
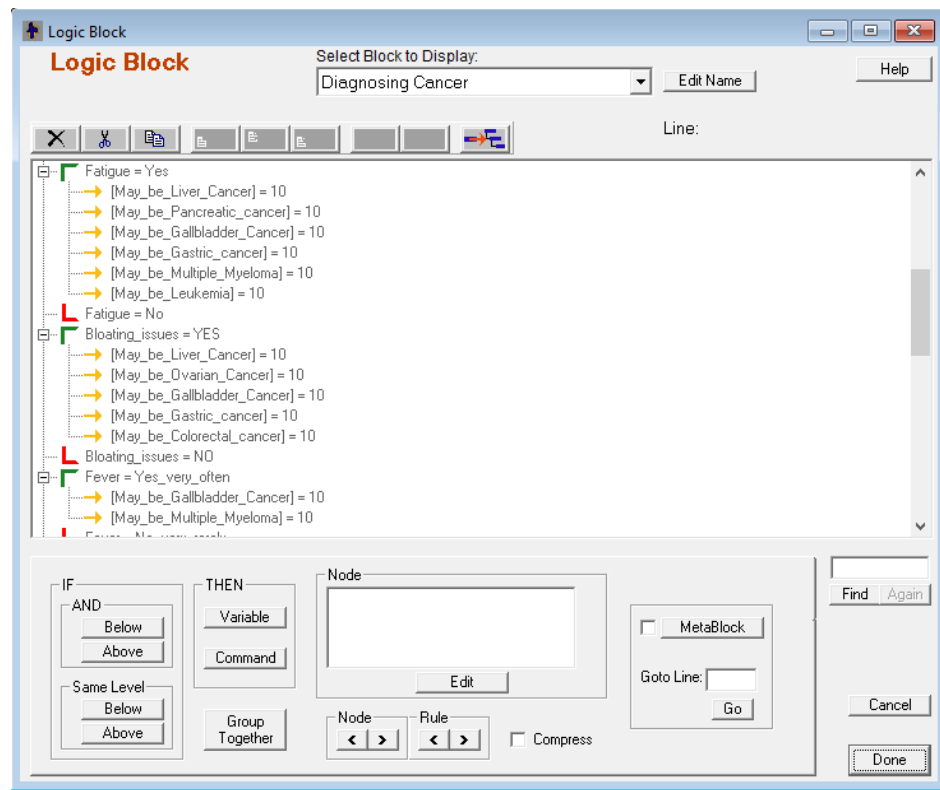
Confidence variables

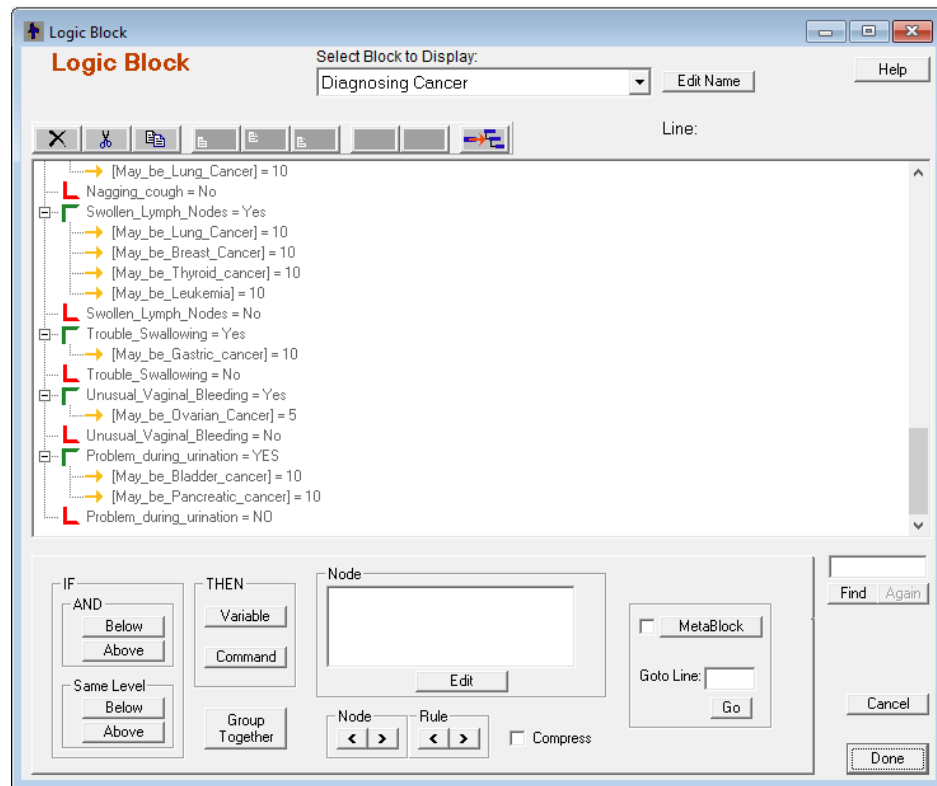
The Variables dialog box is shown with two main sections. The left section, titled 'Continuous', contains a list of numeric variables: Thyroglobulin, Nuclear_matrix_protein_22, Neuronspecific_enolase_NSE, Immunoglobulins, HE4, Chromogranin_A_CgA, Carcinoembryonic_antigen_CEA, Calcitonin, CA199, CA153CA2729, Beta_human_chorionic_gonadotropin, Beta2microglobulin_B2M, and Alphafetoprotein_AFP. The right section, titled 'Confidence', contains a list of categorical variables: May_be_Leukemia, May_be_Multiple_Myeloma, May_be_Colorectal_cancer, Colorectal_Cancer, May_be_Gastric_cancer, May_be_Gallbladder_Cancer, May_be_Pancreatic_cancer, May_be_Ovarian_Cancer, May_be_Thyroid_cancer, May_be_Bladder_cancer, May_be_Breast_Cancer, May_be_Lung_Cancer, May_be_Liver_Cancer, No_cancer, and Cancer. At the bottom of the dialog are buttons for 'New', 'Copy', 'Edit Name', 'Delete', and 'Where'.

2. LOGIC BLOCKS

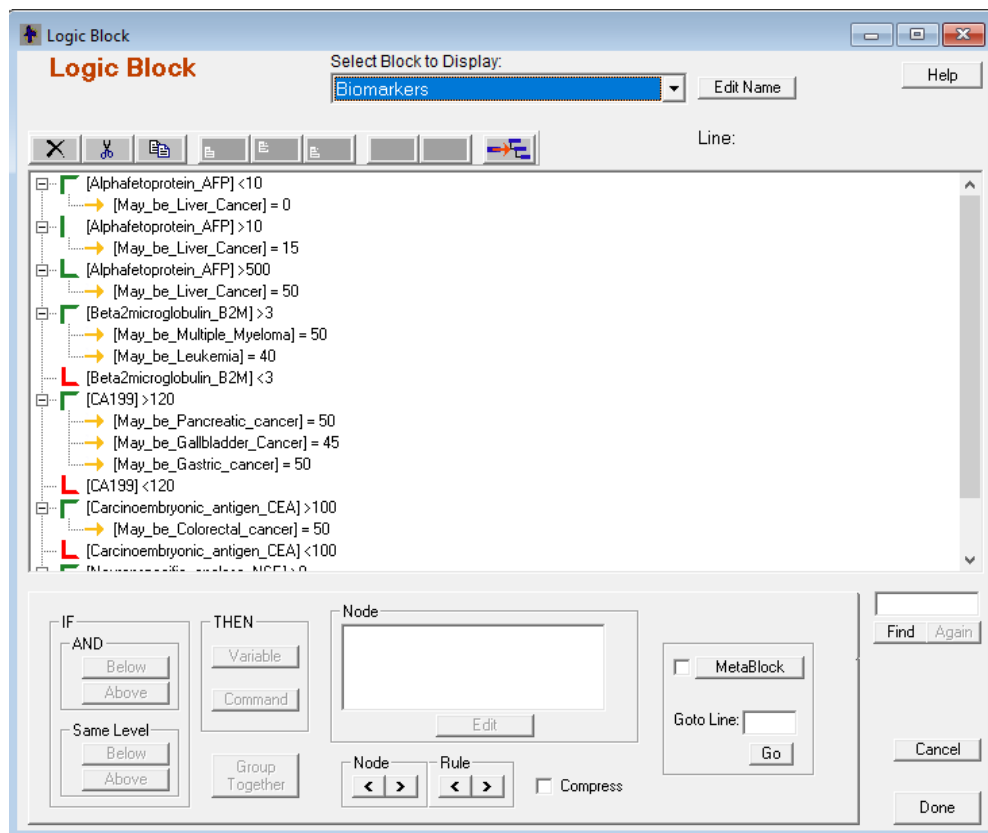
Signs and symptoms for diagnosing cancer

The Logic Block editor is shown with a tree structure for diagnosing cancer. The root node is 'Unexplained_weight_loss = Yes_More_than_10_pounds'. It has two main branches: 'Loss_of_appetite = YES' and 'Loss_of_appetite = NO'. The 'Loss_of_appetite = YES' branch has a list of variables: [May_be_Liver_Cancer] = 10, [May_be_Lung_Cancer] = 10, [May_be_Ovarian_Cancer] = 10, [May_be_Pancreatic_cancer] = 10, [May_be_Gallbladder_Cancer] = 10, [May_be_Gastric_cancer] = 10, [May_be_Multiple_Myeloma] = 10, and [May_be_Leukemia] = 10. The 'Loss_of_appetite = NO' branch has a list of variables: [May_be_Liver_Cancer] = 10, [May_be_Lung_Cancer] = 10, [May_be_Ovarian_Cancer] = 10, [May_be_Pancreatic_cancer] = 10, [May_be_Gallbladder_Cancer] = 10, [May_be_Gastric_cancer] = 10, [May_be_Multiple_Myeloma] = 10, and [May_be_Leukemia] = 10. The editor includes a toolbar with icons for creating and editing logic blocks. The bottom section contains a 'Node' field with an 'Edit' button, a 'Rule' field with 'Node' and 'Rule' buttons, and a 'MetaBlock' checkbox. The 'IF' section has buttons for 'AND', 'Below', 'Above', 'Same Level', 'Below', and 'Above'. The 'THEN' section has buttons for 'Variable', 'Command', and 'Group Together'. The 'Goto Line' field has a 'Go' button. The 'Find' and 'Again' buttons are also present.

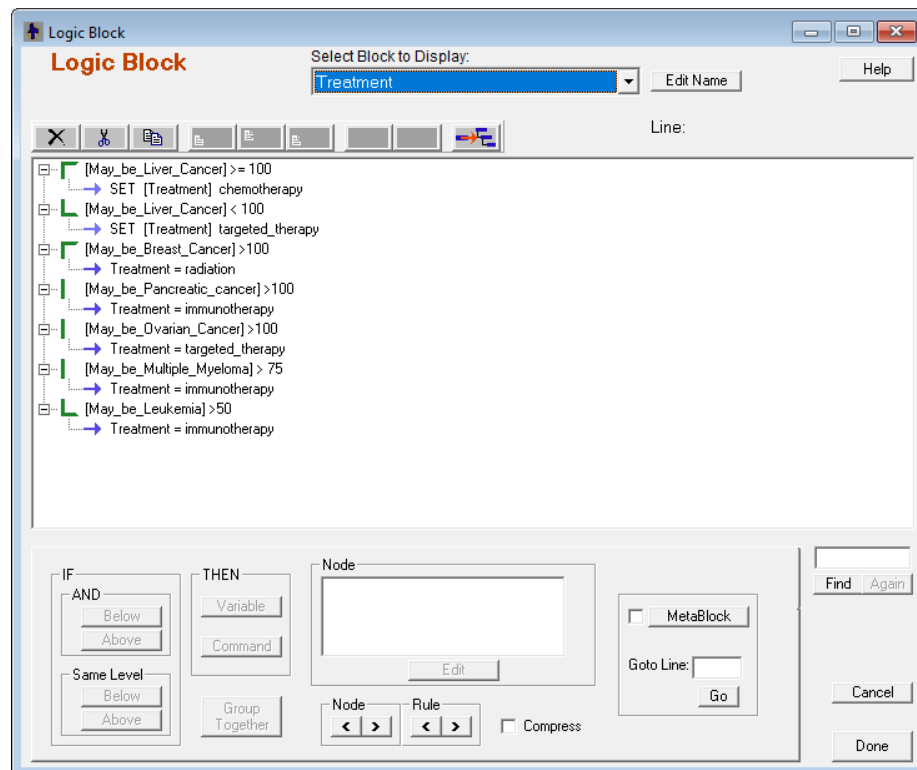




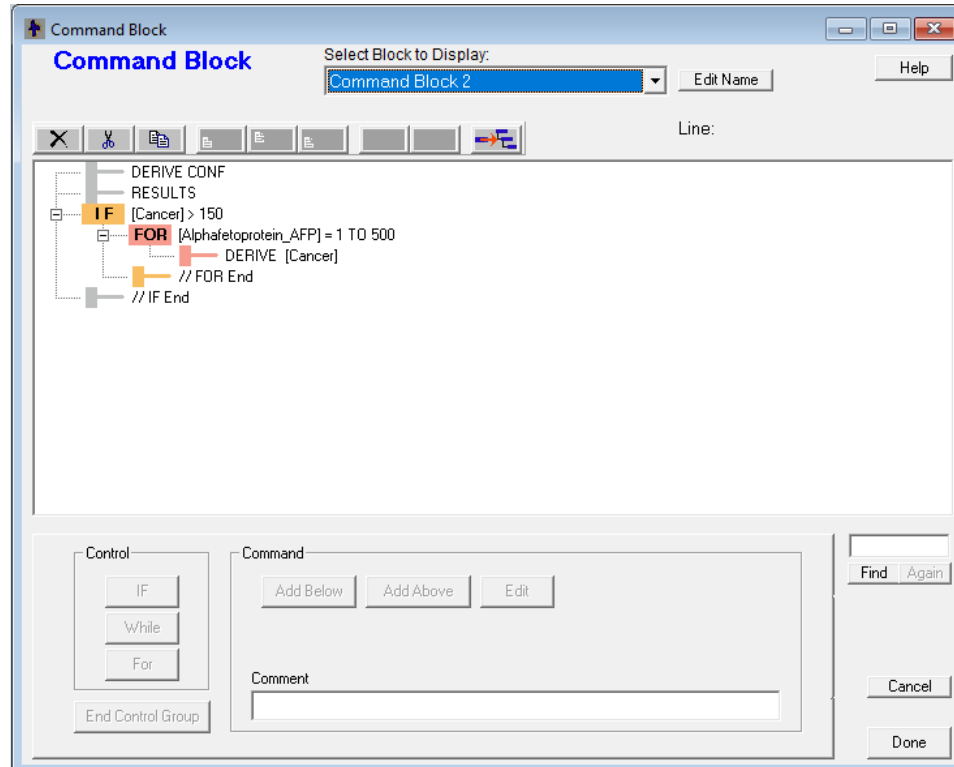
Biomarkers



Treatment



3. COMMAND BLOCKS



4. USER INTERFACE

The user interface with the questionnaire to be filled

Exsys Servlet Runtime

Do you have unexplained weight loss?

- ☒ Yes, More than 10 pounds
☐ No weight loss

OK

Back

Restart

Exsys Servlet Runtime

Do you have a good appetite

- ☒ YES
☐ NO

OK

Back

Restart

Exsys Servlet Runtime

Are you fatigued most of the time?

- ☐ Yes
☒ No

OK

Back

Restart

Exsys Servlet Runtime

Do you have bloating issues and you are not on diet or stress ?

- ☒ YES
☐ NO

OK

Back

Restart

Exsys Servlet Runtime

Alpha-fetoprotein (AFP)

OK

Back

Restart

Exsys Servlet Runtime

Do u have a nagging cough for long term?

☐ Yes

☒ No

OK

Back

Restart

Exsys Servlet Runtime

Are the Lymph Nodes swollen

☐ Yes

☒ No

OK

Back

Restart

Exsys Servlet Runtime

Did u notice any changes in breast recently?

☐ Yes

☒ No

OK

Back

Restart

Exsys Servlet Runtime

Do you have a problem during urination?

☐ YES

☒ NO

OK

Back

Restart

Exsys Servlet Runtime

Do u experience heartburn or indigestion for long term and you are not on diet?

☐ Yes

☒ No

OK

Back

Restart

Exsys Servlet Runtime

Do u have unusual vaginal bleeding?

☐ Yes

☒ No

OK

Back

Restart

Exsys Servlet Runtime

Do you have frequent onset of fever ?

☒ Yes, very often

☐ No, very rarely

OK

Back

Restart

Exsys Servlet Runtime

Do you have a trouble swallowing?

☐ Yes

☒ No

OK

Back

Restart

Exsys Servlet Runtime

Do u find any traces of blood in the stool?

☐ Yes

☐ No

☒ I did not notice

OK

Back

Restart

Exsys Servlet Runtime

Neuron-specific enolase (NSE)

4.5 x

OK

Back

Restart

Exsys Servlet Runtime

CA19-9

29 x

OK

Back

Restart

Exsys Servlet Runtime

Carcinoembryonic antigen (CEA)

 x

Exsys Servlet Runtime

Beta-2-microglobulin (B2M)

 x

5. RESULTS

The results would be as follows showing the possible probabilities of the cancer.

May be Liver Cancer Conf=85.0

May be Lung Cancer Conf=10.0

May be Ovarian Cancer Conf=10.0

May be Pancreatic cancer Conf=20.0

May be Gallbladder Cancer Conf=20.0

May be Gastric cancer Conf=20.0

May be Multiple Myeloma Conf=20.0

May be Leukemia Conf=20.0

The data from the questionnaire is as follows

Do you have unexplained weight loss? Yes, More than 10 pounds

Do you have a good appetite NO

Do u have a nagging cough for long term? No

Do you have bloating issues and you are not on diet or stress ? NO

Do you have a problem during urination? NO

Are the Lymph Nodes swollen No

Do you have a trouble swallowing? No

Did u notice any changes in breast recently? No

Do u have unusual vaginal bleeding? No

Do you have frequent onset of fever ? No, very rarely

Are you fatigued most of the time? Yes

Do u experience heartburn or indigestion for long term and you are not on diet?
No

Do u find any traces of blood in the stool? I did not notice

Alpha-fetoprotein (AFP) 600.0

Beta-2-microglobulin (B2M) 2.6

CA19-9 29.0

Carcinoembryonic antigen (CEA) 3.5

Neuron-specific enolase (NSE) 4.5

The main decision support system was to identify the type of cancer and the with the signs and symptoms and the different biomarkers. The algorithm helped us to identify the probability of having liver cancer with the highest confidence of 85. It can be much more developed by adding more variable and hidden layers of knowledge to get desired output.