Team: Ennbell

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Project Information

This project's central focus is to solve Case 2 (UCR Medical Center Volunteers). Every year, 100 graduates from UCR are selected to participate in the Doctors Without Borders program in collaboration with the UCR Medical Center. The selection process involves factors such as language fluency and medical specialty to match graduates with physicians in countries that they are best suited to perform in. The objective of this case is to essentially simulate and display the probability of a graduate student being sent to a specific country in the Doctors Without Borders program based on language fluency and medical specialty.

Program Objectives

This program will interact with the user as if they were one of the graduate volunteers for the Doctors Without Borders program. The program will prompt the user for information on language spoken (other than English) and their medical specialty. From there, the program's two main objectives is to traverse through the set of physicians in the program for information such as language spoken and medical speciality in order to determine the probability of the graduate being chosen to volunteer in a specific country. The program will list probabilities for each country, then display the country with the highest (matched) probability.

Important Classifications

For simplicity's sake, the limits of this project is to assume that the Doctors Without Borders program involves 10 countries, with 5 languages and 5 medical specializations to choose from.

Countries: Lebanon, Sudan, Belgium, Burkina Faso, Bangladesh, Argentina, Honduras, Mexico, Ukraine, Russian Federation

Languages: Arabic, French, Bengali, Spanish, Russian

Medical Specializations: Cardiology (C), Emergency Medicine (EM), Infectious Disease (ID), Maternal-Fetal Medicine (MFM) , Medical Oncology (MO)

Note that the countries and languages are color-coded to represent which countries speak what languages.

Solution(s)

Static Solution

In this static solution, information on the number of doctors and the number of doctors per specialty are given. The information written in the program is written below. [Format: Country = # of Total Doctors (# in C, # in EM, # in ID, # in MFM, # in MO)]

Lebanon = 9 (1, 2, 1, 2, 3)

Sudan = 12 (2, 3, 2, 3, 2)

Belgium = 8 (1, 1, 2, 1, 3)

Burkina Faso = 11 (3, 2, 1, 2, 3)

Bangladesh = 15 (1, 4, 4, 2, 4)

Argentina =13 (3, 1, 3, 3, 3)

Honduras = 8 (1, 2, 2, 1, 1)

Mexico = 8 (0, 4, 1, 2, 1)

Ukraine = 13(1, 5, 2, 4, 1)

Russian Federation = 3 (1, 0, 0, 1, 1)

Event A represents matching with a physician of the same language fluency in a country.

Event B represents matching with a physician of the same medical specialization.

Utilizing the predetermined data, this program will traverse through the list of countries in the Doctors Without Borders program and determine P(A), P(B), and P(A and B).

Since language fluency and medical specialization are two events that are independent of each other, meaning the probability of one does not affect the other, P(A and B) = P(A) x P(B).

To determine the country that the graduate will be sent to, we must then compare which country has the highest P(A and B).

Implementation of Discrete Structures

This program implements fundamentals of probability we studied in chapter 9.

Limitations of Program

This program definitely does not account for users who are multilingual. As well as that, it does not account for the larger number of countries that are actually involved with Doctors Without Borders. In order to do so with C++, I definitely would have to implement more nuanced code such as utilizing classes, lists, or vectors. It would also be beneficial with a longer list of country information to store and read the data from an external .dat or .txt file.

Pseudocode

Struct COUNTRY

- **int lang (to determine language spoken by country)**
- **int nd (number of doctors in country participating in program)**
- **int spec array (each index represents specialization & each value in array represents num of doctors in specialization**

Main

Initialize country struct array, clist[10]

Initialize all user input variables (ulang,uspec)

Initialize all calculation variables (plang array, pspec array, pab array, maxind=0, maxval = 0.0)

Prompt user to select language they are fluent in & store in ulang

Prompt user to select medical specialization & save in uspec

Loop through all countries (1-10)

if ulang == country's lang, plang = 1.0

else plang == 0.0

Loop through all countries (1-10)

calculate pspec, pspec = clist.spec[uspec]/clist.nd

Loop through all countries (1-10)

calculate pab, pab = plist * pspec

Loop through all countries (1-10)

If pab[i] > maxval,

Set that pab index to maxval

Set maxind to index in loop

Loop through all countries

Print pab[i] of each country

Print name of country with highest probability