Econ223

May 9, 2011

Inference Task Survey and Questions

Please Print:

Your Name:

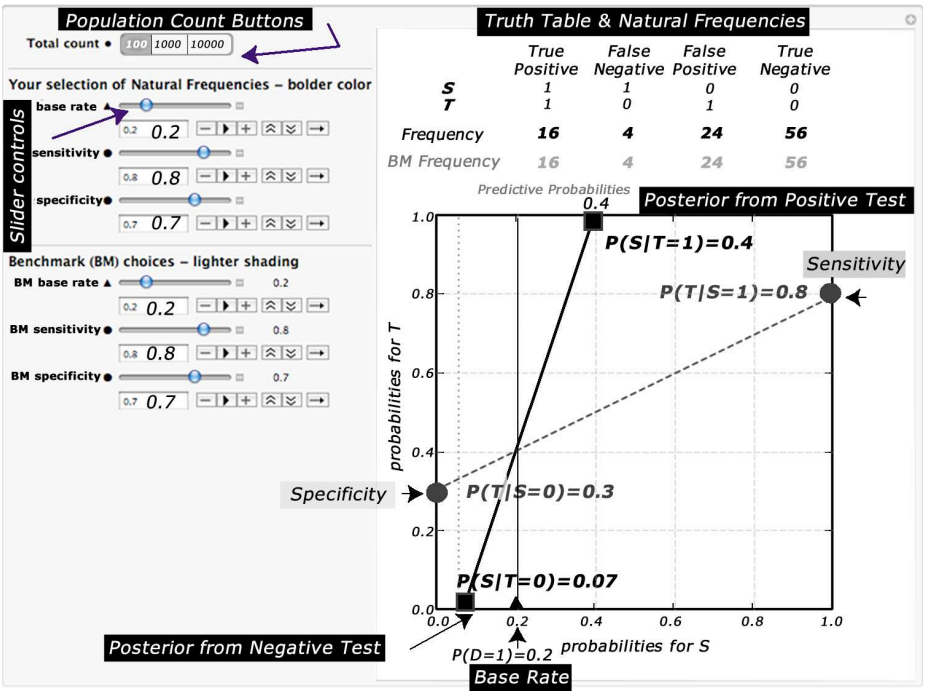
Your email (or UC usercode)

Your Student ID:

Survey and Questions: introduction

Phil Gunby and I are trying to evaluate a software tool (M.I.T. = My Inference Tool) that we have developed to help people understand inverse probability concepts and reasoning methods. We'd like your help as testers and evaluators. I'm willing to pay for your efforts here. ***But as importantly for you , the practice in doing this evaluation will help your understanding of inverse probability reasoning that we have been doing in class.*** While you can't take the M.I.T. inference tool into the exam -you can't take **any** calculators into the exam! -playing around with it, learning how to use it to express uncertainties, and completing this evaluation program will definitely increase your chances of getting a good mark on the final exam question on this topic (there will be one!!).

1. go to the uctv web site http://uctv.canterbury.ac.nz/post/4/1139 where you can follow the instructions and download Mathematica player (the software that gets you the nice interface below):



2. At this site you can have a listen to the webcast tutorial on the interface (about 25 minutes -a good revision of the material we did in class) or just dive in and explore (eg try to create a truth table that matches the one we did in class using Gigerenzer's example of breast cancer diagnosis -hint set the menu button to 1000)

3. After downloading and exploring the MIT software on uctv , use this booklet to attempt 10 inference questions All questions will be short, in the same format as the questions we did in class -with different numbers and maybe slightly

different contexts (medical, legal, HR management, educational testing). Some of these questions are on previous years exams.

4. There will be a **short written survey** at the beginning and at the end of the questionnaire about your experience with the M.I.T software and with this questionnaire. Please take the time to complete the survey .

5. Then I'd like you to turn that question booklet with your answers and survey response in to me **at the latest by Tuesday May 17 midday, in class, or earlier.** I'll read what you submit , check your responses and give the results back to you so that you can have feedback on how you are doing on this topic before the final test.

I'll pay $5 cash for each student who completes all the steps above PLUS a bonus 50¢ per question in step 4 for an accurate answer to each inference task question. *Accurate means within a few percentage points of the "correct" answer for each question*.

You may decide to work on these inference tasks on your own or with someone else. I don't mind either way, but in order to assess the effectiveness of the MIT inference tool I do need to know whether the results you turn in are the result of a collective effort or your own effort. This is **not** a "test" of you ; I won't be giving you any kind of "grade" for helping me evaluate this software in comparison to manual calculation methods.

INITIAL SURVEY: a few questions to get some information about how you approached these problems

CLASSES

Did you attend the class on Tuesday (May 3, 2011) Y/N (circle)

Did you listen to the class recording for Tuesday May 3, 2011? Y/N

DOWNLOADING THE SOFTWARE

How straightforward was this? (circle)

No problem				Quite difficult

Any comments on the downloading and installation?

_____

_____

LEARNING TO USE THE SOFTWARE

What approach did you use?

Trial and Error o Listen to the webcast o Both o

Comments: _____

_____

IF YOU USED THE WEBCAST TUTORIAL. . . .from your point of view . . .

1. How effective/useful was the explanation about the slider?

Very Effective	Effective	Neither Effective nor Ineffective	Ineffective	Very Ineffective

Comments: _____

_____

2. How effective/useful did you find the explanation about the "Truth table and natural Frequency"

Very Effective	Effective	Neither Effective nor Ineffective	Ineffective	Very Ineffective

Comments: _____

_____

3. How effective/useful did you find the explanation about the diagram of probabilities?

Very Effective	Effective	Neither Effective nor Ineffective	Ineffective	Very Ineffective

Comments: _____

_____

QUESTION TO ANSWER WHEN YOU HAVE FINISHED:

Did you work on your own independently on the following questions or with a friend or other group of students? (Note I am perfectly happy either way , working on your own, working with others. In order to assess effectiveness I just need to know honestly one way or the other).

Own o Independently o

Any final comments

_____

_____

_____

_____

The questions

Question 1

You are a nurse in a small primary school in the North Island. A child patient of yours is running a fever. The child could have the swine flu, which is serious, but there are many other causes of fevers in school children.

Statistically, the health Board says that only 10% of primary school children have swine flu in your area. When a child does have swine flu there is a 90% chance the child will have a fever. Of the 90% of children in the school who do not have swine flu, around 2/3 (67%) of them of them, will be not be running a fever while the other 1/3 will - due to something other than swine flu.

What do you think your patient's chances of having swine flu are? (either fractions or decimals are ok)

What method did you use to calculate your answer (circle all that apply)?

- M.I.T software
- Manually
- Other Calculator

If MIT software: what slider input values did you use? Please enter the slider values (you can read the value off the M.I.T interface)

total count button:	sensitivity slider
base rate slider:	specificity slider

If manually or otherwise please show any working (graphs, tables sketches, calculations?) in the space below:

Question 2

You are a doctor. A male patient of yours reported problems of memory loss and is concerned that he might have Alzheimer's disease. You organize a CT (computer tomography) scan which shows there are some abnormalities in his brain.

Statistically, 10 out of 1000 men his age have Alzheimer's disease. Of the 10 who have Alzheimer's 80% (8) show abnormalities in a CT scan of the brain while the other 20% (2) won't. Of the 990 who do not have Alzheimer's, 67% (660) will also show abnormalities in the brain with a CT scan, while 33% (330) won't show any abnormalities.

What do you think your patient's chances of having Alzheimer's disease are? (either fractions or decimals are ok)

What methods did you use to calculate your answer (circle all that apply)?

- M.I.T software
- Manually
- Other Calculator

If MIT software: what slider input values did you use? Please enter the slider values (you can read the value off the M.I.T interface)

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Question 3

You are a police officer in a small Australian town. During the day there are typically 100 cars driving on the streets in this city. 20% of these 100 cars will be stolen cars (it's a nasty little town) , and the other 80% will be being driven legitimately. The police statisticians know from their records that that if a car being driven is a stolen car there is a 90% chance that the driver is a teenager. They also know that if a car is being driven legitimately there is a 50% chance that it will be driven by someone who is **not** a teenager. You have just seen a car being driven by a teenager.

What do you think the chances are that the car you see is a stolen car? (either fractions or decimals are ok)

What methods did you use to calculate your answer (circle all that apply)?

- M.I.T software
- Manually
- Other Calculator

If MIT software: what slider input values did you use? Please enter the slider values (you can read the value off the M.I.T interface)

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Question 4

You are a University lecturer. Parents of a student in a first year course of yours are concerned whether their daughter will pass the course, and have asked you whether tutorial attendance is a very good indicator of passing. Their daughter has **not** attended tutorials all year. Looking at your past records for the course, you note that typically 80 out of every 100 students will pass. Digging a little deeper you find that 48 of the 80 who pass the course attend tutorials, while 12 of the 20 who typically fail the course do attend tutorials.

What do you think the daughter's chances of passing the course are? (either fractions or decimals are ok)

What methods did you use to calculate your answer (circle all that apply)?

- M.I.T software
- Manually
- Other Calculator

If MIT software: what slider input values did you use? Please enter the slider values (you can read the value off the M.I.T interface)

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Question 5

You are an HR recruitment manager for a large company that invests in on the job training. You are interviewing a young woman for a job. Job retention is a problem in your company – the company doesn't want to waste time and effort training people who will just leave. Records show that 98 out of every 100 new employees in the company will not leave – ie they will be "**stayers**" - but 2 of every 100 will be "**leavers**". A consultant argues on the basis of statistics that 89 of 98 (91%) stayers are male and the other 9 (9%) are female. Of the 2 leavers typically one will be female and one will be male.

On the basis of the information you have what do you think the woman's chance of being a "stayer" are? (either fractions or decimals are ok)

What methods did you use to calculate your answer (circle all that apply)?

- M.I.T software
- Manually
- Other Calculator

If MIT software: what slider input values did you use? Please enter the slider values (you can read the value off the M.I.T interface)

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Question 6

You are a potential car buyer at ABC Auctions. The car you are interested in could be a plum (a good car) or a lemon (a bad car). Everyone knows that 70 out of 100 cars offered at ABC auction yard are actually lemons. The AA (Automobile Association) will do a test on the car and give it an overall rating of "thumbs up" or "thumbs down". If you took any 10 cars that really are plums to the AA , their testers will correctly report that (thumbs up) 9 times, but the other 1 time it will make an error and report thumbs down on a plum. If you took any 10 cars that really are lemons to the AA , their testers will correctly report that (thumbs down) 7 times, but the other 3 times it will make an error and report thumbs up for a lemon. So the AA is a bit more accurate at detecting plums (good cars) than it is at detecting lemons (bad cars). The AA has given the car you are interested in a thumbs up rating.

On the basis of the information you have what do you think the chances are that your car is a plum? (either fractions or decimals are ok)

What methods did you use to calculate your answer (circle all that apply)?

- M.I.T software
- Manually
- Other Calculator

If MIT software: what slider input values did you use? Please enter the slider values (you can read the value off the M.I.T interface)

total count button:	sensitivity slider
base rate slider:	specificity slider

If manually or otherwise please show any working (graphs, tables sketches, calculations?) in the space below:

Question 7

Car theft is a problem in in New Zealand. The police are proposing a crackdown on young drivers - ie stopping and thoroughly searching/questioning any drivers who appear to be under 25. They justify their policy claiming that statistics show that age of the driver is a good diagnostic signal for car theft . The statistics on which they base their belief indicate that 9/10 (90%) of all stolen cars are indeed stolen by younger drivers (age under 25), whereas only 1/3 (33%) of cars that have not been stolen have drivers' ages under 25 , almost a 3 fold increase. The costs of stopping every car on the road to find out whether it is stolen are prohibitive, since out of 1000 cars driving on the road at any time, 10 will be stolen (ie a 1% stolen car rate).

Next time you , or a policeman, see someone under 25 driving a car, what are the chances that the car is stolen? (either fractions or decimals are ok)

What methods did you use to calculate your answer (circle all that apply)?

- M.I.T software
- Manually
- Other Calculator

If MIT software: what slider input values did you use? Please enter the slider values (you can read the value off the M.I.T interface)

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base rate slider:	specificity slider

If manually or otherwise please show any working (graphs, tables sketches, calculations?) in the space below:

Question 8

You are a doctor. A young (20-30 years old) male patient of yours just came in with a positive ELISA test indicating recent exposure to HIV virus. He claims his lifestyle does NOT involve having sex with men. You believe him on that count, ie that he is heterosexual, not hom0sexual. The ELISA test is good, but not perfect.

The probability of AIDS is 0.1% (1 in 1000) for young heterosexual men of his age. If a heterosexual man of his age/lifestyle actually has AIDS, the probability is 95% (0.95) that he will get a positive ELISA test and 5% that he will get a negative ELISA test result. If a man of his age/lifestyle does not have AIDS, the probability is 90% that he will get a negative ELISA test result and 10% that he will get a positive ELISA result. The young man sitting in front of you took the ELISA test and the result was positive "+".

What do you think the chances are of your young male patient having AIDs? (either fractions or decimals are ok)

What methods did you use to calculate your answer (circle all that apply)?

- M.I.T software
- Manually
- Other Calculator

If MIT software: what slider input values did you use? Please enter the slider values (you can read the value off the M.I.T interface)

total count button:	sensitivity slider
base rate slider:	specificity slider

If manually or otherwise please show any working (graphs, tables sketches, calculations?) in the space below:

Question 9

You are a doctor. This same young man in the previous question (number 8) now tells you that he has just spent 6 months exploring - and partying - in South Africa, where the prevalence of AIDS among young heterosexual men his age is around 40%. How does that change your assessment of his chances of having AIDS?

What do you think the chances are of your young male patient having AIDs? (either fractions or decimals are ok)

What methods did you use to calculate your answer (circle all that apply)?

- M.I.T software
- Manually
- Other Calculator

If MIT software: what slider input values did you use? Please enter the slider values (you can read the value off the M.I.T interface)

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base rate slider:	specificity slider

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Question 10

You are a juror in a court case. A cab was involved in a hit and run accident at night when visibility was poor – it was a dark and stormy night. There was one witness.

You are given the following information. Two cab companies, the Red and the Blue, operate in the city. There are 100 cabs in total the city. 75 of the 100 cabs are Red and 25 of the 100 cabs are Blue. The witness reported that the cab involved in the accident was Blue. The court tested the reliability of the witness under the same circumstances that existed on the night of the accident and concluded that the witness' report correctly identified each of the two colors 80% of the time and failed 20% of the time. That is when the cab really was Blue the witness reported Blue 80% of the time while when the cab was really Red the witness reported Red 80% of the time.

What do you think the chances are of the car being Blue? (either fractions or decimals are ok)

What methods did you use to calculate your answer (circle all that apply)?

- M.I.T software
- Manually
- Other Calculator

If MIT software: what slider input values did you use? Please enter the slider values (you can read the value off the M.I.T interface)

total count button:	sensitivity slider
base rate slider:	specificity slider

If manually or otherwise please show any working (graphs, tables sketches, calculations?) in the space below:

(when you finish, don't forget to go back and complete the question on page 3)