Final Project: BAC Calculator

Section: 063

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Problem Statement

- Most car accidents are a result of irresponsible drunk driving
- People may not be aware of their level of alcohol intoxication in comparison to the legal BAC limit
- Not everyone knows their limits of drinking

Purpose

- Calculates Blood Alcohol Content
  - Takes in multiple factors (weight, number of drinks consumed, etc) and returns BAC
- Gives a plot to estimate the decrease of BAC every hour
  - Includes line that indicates what the BAC legal limit is for breathalyzer test
- Determines whether someone is sober or not

Approach

1. Create a GUI that intakes strings as factors

2. Take the input of different types of alcohol and amount consumed

3. Create a function that computes all input factors into a BAC value

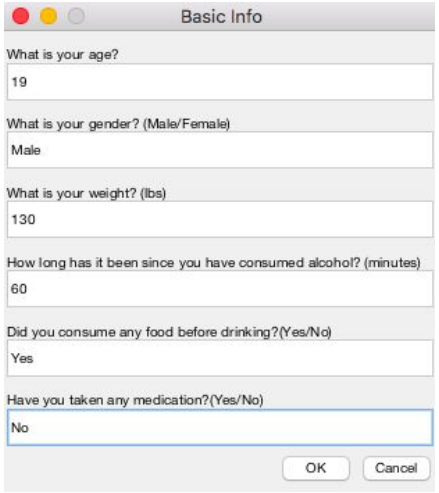
4. Create a plot graph that displays the decrease of BAC at a linear rate over time

5. Returns text containing information about input factors and how long it would until user is sober

GUI Factor Menu

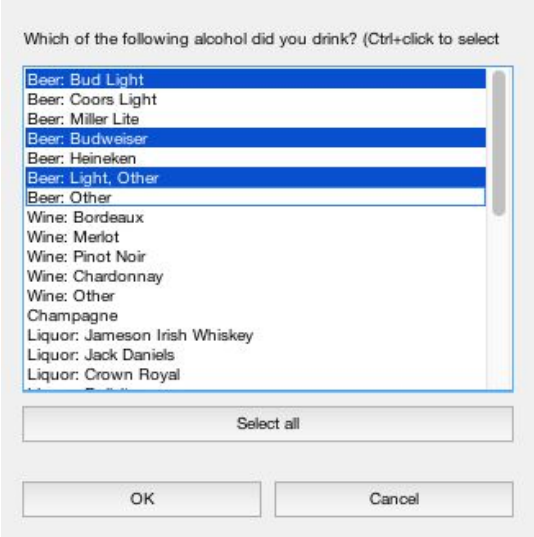
- User inputs different factors in the factor intake menu

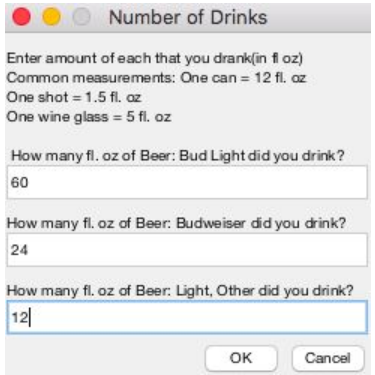
- Displays error if input is invalid



Inputting Alcohol Type and Amount Consumed

- User selects from a list of alcohol types provided on the menu
- User inputs the amount (oz) of alcohol consumed
- Spreadsheet stores ABV of each drink





Calculating BAC Value

- Create a function that takes all the variables influencing alcohol intoxication
- Returns a calculated BAC value with given inputs

- Challenge: weighing the significance of each factor

```
function bac = calcBAC(alcConsumed, age, weight, gender, time, med, food)
    if lower(gender) == 'male'
        r = 0.73;
    else
        r = 0.66;
    end
    if lower(food) == 'yes'
        if time > 30
            time = time - 30;
        else
            time = 0;
        end
    end
    if age > 21
        factor = (age-21)/100 + 1;
    else
        factor = 1;
    end
    if lower(med) == 'yes'
        factor = factor + .1;
    end
    bac = ((factor * alcConsumed * 5.14) / (weight * r)) - 0.015*(time/60);
end
```

Final Text Box

- Returns information of the user’s inputs
- Tells user the BAC value
- Tells user how long it will take for them to be sober

Plotting BAC Decrease Rate

- Shows a linear plot of BAC vs time (hr)
- Displays legal drinking limit
- Displays point of impaired driving

Code

```
function inputs = takeFactors()
    T = readtable('alcDrinks.xlsx', 'ReadRowNames', true);
    while true
        prompt = {'What is your age?','What is your gender? (Male/Female)', ...
            'What is your weight? (lbs)','How long has it been since you have consumed alcohol? (minutes)', ...
            'Did you consume any food before drinking?(Yes/No)','Have you taken any medication?(Yes/No)'};
        userInfoCell = inputdlg( prompt, 'Basic Info', 1);
        [~, tf1] = str2num(userInfoCell{1});
        if ~tf1
            uiwait(msgbox('Please enter a positive integer for age.', 'Error!'));
            continue;
        end
```

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    if age > 21
        factor = (age-21)/100 + 1;
    else
        factor = 1;
    end
    if lower(med) == 'yes'
        factor = factor + .1;
    end
    bac = ((factor * alcConsumed * 5.14) / (weight * r)) - 0.015*(time/60);
end
```

```
        alcConsumed = sum([alcoholAmounts{:}]);
        age = personalFactors{1,1};
        weight = personalFactors{1,2};
        gender = string(personalFactors{1,3});
        time = personalFactors{1,4};
        food = string(personalFactors{1,5});
        med = string(personalFactors{1,6});

        BAC = calcBAC(alcConsumed, age, weight, gender, time, med, food);
        if BAC < 0
            BAC = 0;
        end

        if lower(food) == 'yes'
            foodStr = 'You ate food before drinking.';
        else
            foodStr = 'You did not eat before drinking.';
        end
        if lower(med) == 'yes'
            medStr = 'You had medicine before drinking.';
        else
            medStr = 'You did not have medicine before drinking.';
        end
        messageString = { 'You are a ' + string(age) + ' year old ' + gender + ', who weighs ' + string(weigh
            foodStr, medStr, 'It has been ' + string(time) + ' minutes since you drank.',...
            'You have consumed ' + string(round(alcConsumed,2)) + ' ounces of alcohol, causing ' + string(rou
            'You will be completely sober in ' + string(floor(BAC/0.016)) + ' hours and ' + string(ceil(((BAC
        uiwait(msgbox(messageString, 'Summary'));
```

```
endNum = ceil(BAC/0.016);
for t = 1:endNum
    if BAC > 0
        BAC = BAC - .016;
        if BAC < 0
            BAC = 0;
        end
    else
        BAC = 0;
    end
y1(t)= BAC;
end

for i = 1:endNum
    elaptime= timestart + (i - 1);
x1(i)=elaptime;
end

for i = 1:endNum
    alclim = .08;
y2(i) = alclim;
end

for i = 1:endNum
    impaired = .04;
y3(i) = impaired;
end

plot(x1,y1,x1,y2,x1,y3)
```

Concepts Used

- Loops - incorporated with BAC graph to plot linear points
- Plots - takes BAC value from user and shows change in BAC per hour
- String Manipulation - intaking string in GUI and returns text
- GUIs - receives inputs of different variables that affect alcohol intoxication
- If else statements - used with returning text to user
- Functions - created to calculate value for BAC
- Cell arrays - used to store values of x and y on graph to be plotted

Conclusion

Our code will help drinkers know their BAC level

Drinkers will:

- Make smarter decisions on intaking alcohol

- Know if they are above the legal limit

Sources

http://www.brad21.org/bac_charts.html

http://celtickane.com/projects/blood-alcohol-content-bac-calculator/

https://www.go2hr.ca/sites/default/files/legacy/pdf/go2HR-SIR-Tip-Sheet-Factors-That-Influence-Intoxication.pdf