Lari Kunnasmaa

1 RPA project explanation

Hello again, This pdf contains an explanation and a some visuals of the code related to my free time RPA project. Yes, I know this type of project might seem laughable, but I really believe this type of code could be used in a real world application or at the very least shows my passion for these types of projects. The project uses OCR, Pyautogui, Pywinauto to deliver an easy solution to problem that would otherwise require a lot of manual and repetitive work. I hope you enjoy.

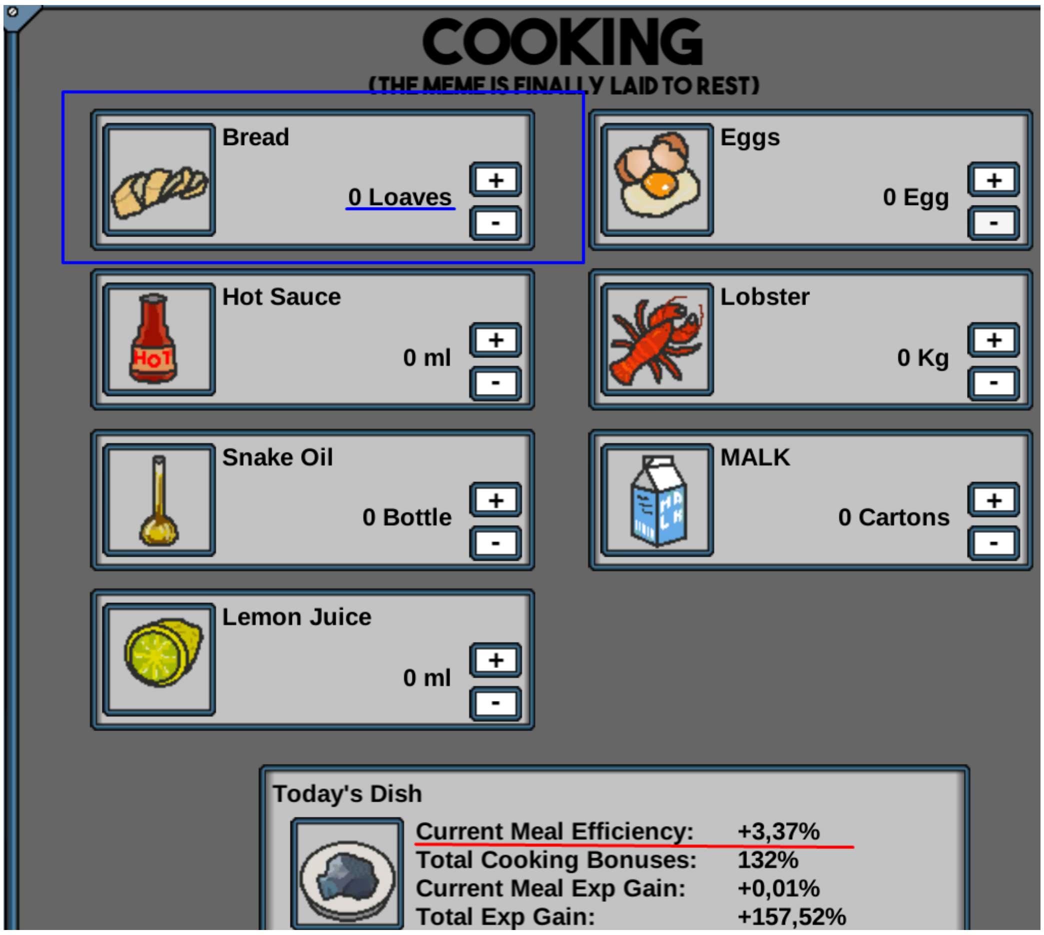
2 Real world application

As an example lets say your "dear"summer-intern has scanned a bunch of similar documents. You need to add together a specific value from each document. The scans made by the intern are not that good (who could have guessed). This means you simply can't look at specific pixels to get the value you want. You also can't just look for numbers on the sheets since your code would mistake other numbers from the sheet leading to a false result. Also, the intern is your bosses son, so explain go ahead and explain why the intern is not good enough. However, you notice a small anchor logo (foreshadowing) in the corner and you know that with a slight and I do mean slight modification to this code could be used to get the values you want and to add them together as requested. Before we get to the "serious"stuff, if you are still here, there is an inspirational photo in the next page to keep you motivated to continue reading.

Kuva 1: Ha, made you look. Also by reading this you are legally or at least morally obligated to read the rest of the document. Thank you

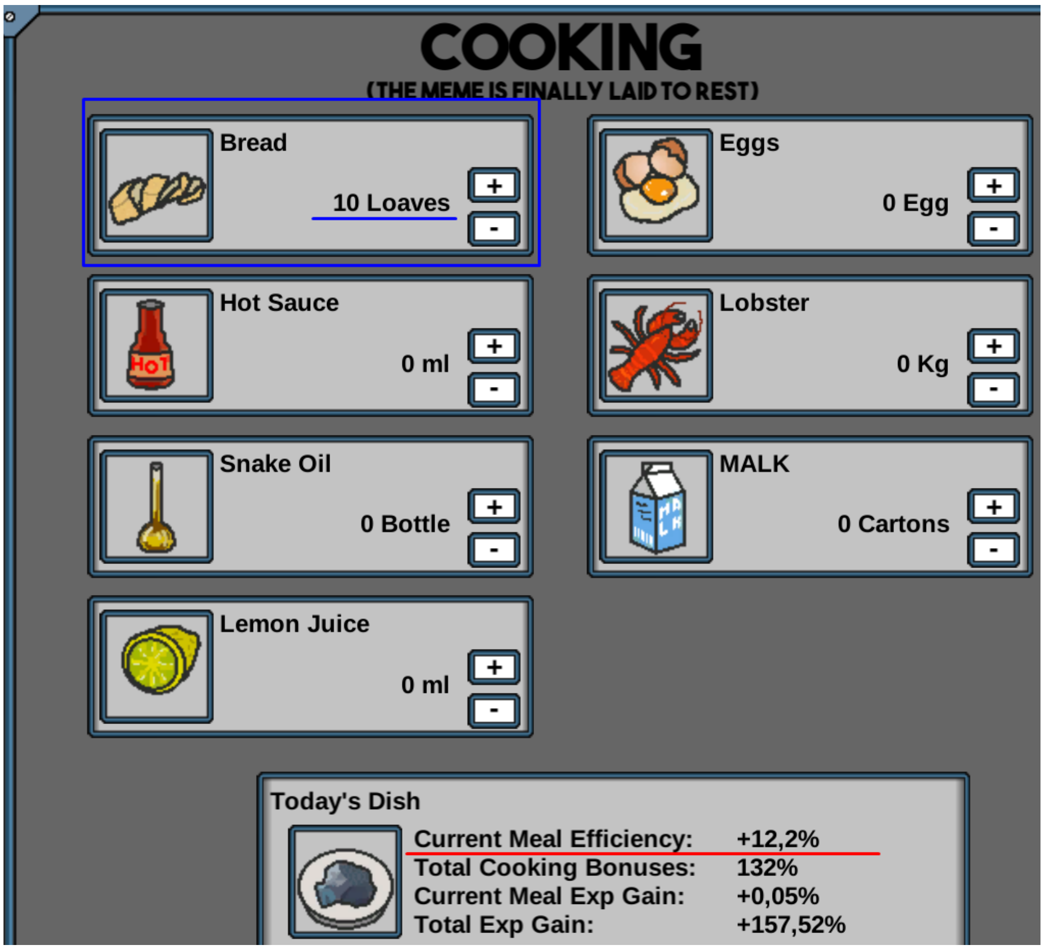
3 Problem

So, the problem goes like this. In figure ?? you can see 7 "ingredients"(first one marked with blue), that make the today's dish. The amount of ingredients determine the Current Meal Efficiency or the (CME). The goal is to get the highest CME value (100), the optimal ingredient amounts are random so, you have no idea on how much of each ingredient should you add.



Current Meal Efficiency: +3,37%
Total Cooking Bonuses: 132%
Current Meal Exp Gain: +0,01%
Total Exp Gain: +157,52%

Kuva 2: Basic screen, we can see all of the ingredients and the first one is inside the blue box for clarity. The Current Meal Efficiency (CME) marked with the red line, current value 3,37.



Bread
10 Loaves

Eggs
0 Egg

Hot Sauce
0 ml

Lobster
0 Kg

Snake Oil
0 Bottle

MALK
0 Cartons

Lemon Juice
0 ml

Today's Dish

Current Meal Efficiency:	+12,2%
Total Cooking Bonuses:	132%
Current Meal Exp Gain:	+0,05%
Total Exp Gain:	+157,52%

Kuva 3: Basic screen, but now we have added 10 of the first ingredient (blue box), this has also raised the CME to 12,2 (red line) value. But if we increase or decrease the ingredient amount, we have no way of knowing how does it change the CME.

This means that to get the highest CME value you would need to go thought all the ingredients, adding one at a time looking if, the CME is higher than the current highest value. We can add ingredients by pressing its plus box and decrease by pressing the minus. Because you can a maximum of 20 for each ingredient, you would have to click $7 \cdot 20$ clicks $= 140$ times, to find the highest value. Not to mention going back to set the right values, so on average $\frac{20}{2} \cdot 7 = 70$. So, that would be 210 clicks each time you want the highest CME, do you want carpal tunnel, because that is how you get carpal tunnel.

4 Solution

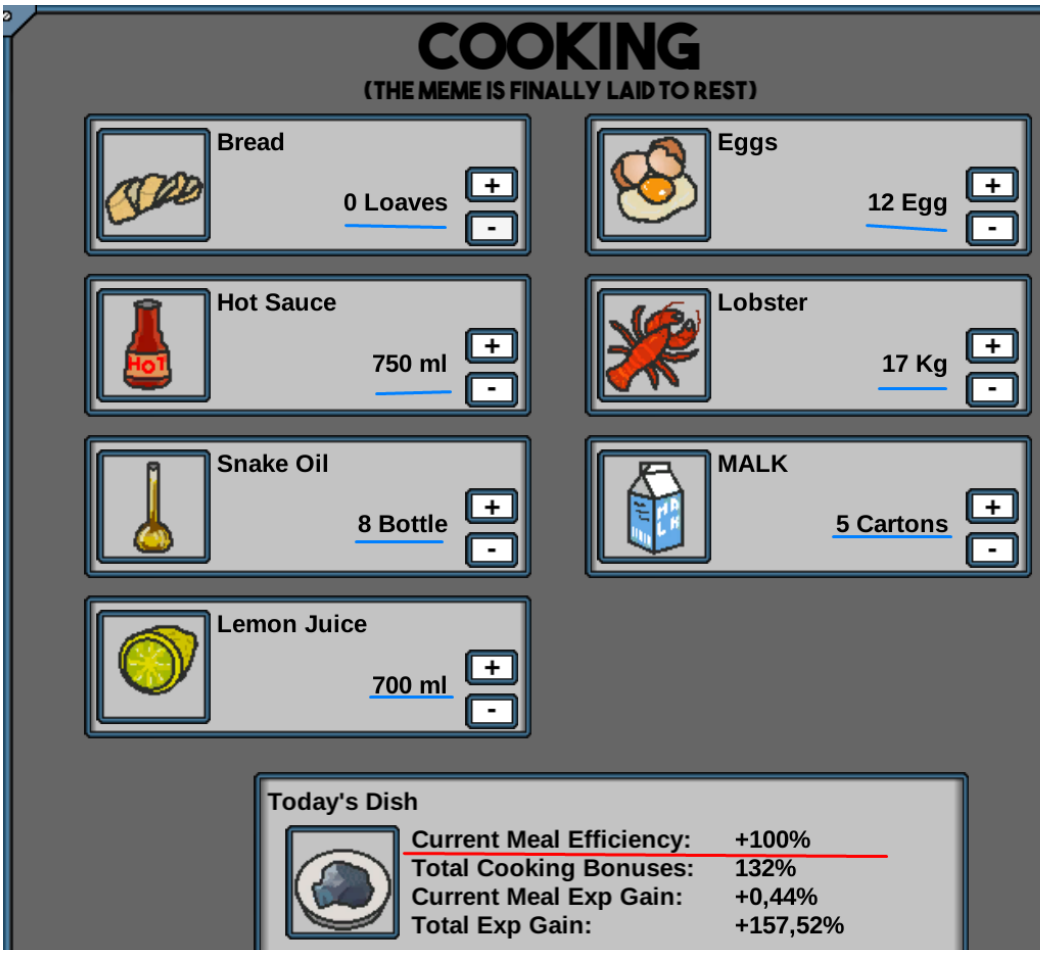
Let's solve the problem. So to get the maximum CME we first need to know what current value of the CME is (and no you can't just mouse over it and get it, I tried after which I cried). So, we need to use some sort of ocr to get the value. However, we need to take in to account if the window could have been moved or its resolution changed, so we can't just look at specific pixels for the value. Also, we cannot just start to look at numbers, because as we can clearly see in the figures **??** and **??** there are several different numbers right next to the CME, so there is a high chance of a wrong result.

The solution I took is to search for a picture of the "Current Meal Efficiency"in the application using pyautogui. Since it is the only one, we can use it as an anchor to tell where each button and value is in relation to the anchor, with coordinates. This way we can be sure that every CME, value that is read or every plus/minus box clicked will the right one. Now we can create two loop loop over each ingredient and between its min and max amounts(0-20). The pseudocode below might help to understand.

```
Get CME position to anchor everything
for $Ingredient$ in $Ingredients$ do
    for $Current_{amount}$ in $Max_{amount}$ do
        $Check\ CME\ value()$
        if $Current_{CME} > Max_{CME}$ then
            $Max_{CME} = Current_{CME}$
        end if
        Move the mouse to the plus box (pyautogui)
        Click the box to add one to the ingredient (pyautogui)
    end for
end for
```

5 Results

After running the code, we can see in figure ?? that it has found the optimal ingredient composition, so the CME is 100. The code can be used to solve any combination of ingredients with ease and without clicking 210 times thanks to python. The code is also made in a way so that it is easy to scale it. This is because I I highly recommend looking at the code, since the pdf does not go too deep about the actual execution and the safety check. Second to last section, don't worry it this ends after this.



Current Meal Efficiency: +100%
Total Cooking Bonuses: 132%
Current Meal Exp Gain: +0,44%
Total Exp Gain: +157,52%

Kuva 4: Because the code found the optimal amount of ingredients the CME is now at 100

6 Thank you

So, you might ask your self why did he make such a complex script for dumb game and my answer would be its about the journey not the destination. It may come as a "huge"shock for you, but this project was never going to be released. But, I realized that it show my passion for problem -solving and especially for automating everything, so here it is. Feel free to ask me about the project or any of others I have done. Also my thesis code contains a large automation part as well, it start from pdf 3.

To people who actually read the whole pdf, Thank you. Everytime I make one of these I feel it gets too, long but I feel so obligated, because I don't think just showing the code gives it any meaning it is just lines of text. So, I ask you to give ANY feedback on them.