Lambda Function

Presented by Group 7: Yilin Pan, Xiaojing An, Weihang Ding

Introduction

Lambda functions provide a concise way to create: 1. small, anonymous functions 2. ithout needing to define a formal function using def.

Syntax

```
# this is a def function
def triple(a):
    return a*3

# this is a lambda function
lambda a: a*3
```

You may notice that Lambda functions *implicitly return* the result of evaluating the expression, while def functions use an explicit return statement. Also, Lambda functions are limited to a *single expression*. Def functions can contain multiple statements and have more complex logic.

Live code example: Gradebook

Requirement

In gradebook, find:

1. a student with a given name
2. students who passed final exams
3. students whose final exam scores are higher than mid-term exam scores.
4. students whose have average homework scores greater than 80.

You may notice that each requirement is to find a specific group of students in all students. Instead of writing 4 independent functions with repititive codes, we can write a function which can filter students out, based on another function which defines students selection criteria.

Below is the code snippet of using lambda function to achieve above goals.

```
def filter(students, predicate, index=0) -> list:
    if index >= len(students):
        return []
    student_found = filter(students, predicate, index + 1)
    current_student = students[index]
    if predicate(current_student):
        student_found.append(current_student)
    return student_found

# Find students by name
student_named_harry = filter(
    students, lambda student: student.name == 'Harrier Dubois')

# Find students with final score greater than 83
students_with_final_greater_than_60 = filter(
    students, lambda student: student.final > 83)

# Find students with final score greater than midterm
students_with_final_greater_than_midterm = filter(
    students, lambda student: student.final > student.midterm)

# Find students with average homework score greater than 80
students_with_average_homework_greater_than_80 = filter(
    students, lambda student: sum(student.homework) / len(student.homework) > 80)
```

Note: filter is actually a higer-order function in python, which has similar logic as the above filter function. You can search it if you are interested.

Citation

> 1. Northeastern CS 5001, homework 5, gradebook, https://northeastern.instructure.com/courses/192162/assignments/2364714?module_item_id=10749754
> 2. How to Use Python Lambda Functions, by Andre Burgaud, 19 Jun 2019, https://realpython.com/python-lambda/
> 3. Python Lambda Functions, Last Updated: 20 Jun 2024, https://www.geeksforgeeks.org/python-lambda-anonymous-functions-filter-map-reduce/