PYTHON 软件工程师招聘
家庭作业

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说明

在面谈之前，你需要先完成一定数量的家庭作业，并将已完成作业提交给面试官。面试官会评估你提交的作业，并选择是否邀请你来面谈。因此，请认真对待本次家庭作业。

本次家庭作业共有 5 个编程问题，请选择其中至少 3 个，完成并提交给面试官。完成数量不足 3 个的作业将会被直接忽略，请注意完成作业数量。

请注意，本次家庭作业需使用 Python 作答，不接受其他编程语言。

请提交作业时务必附带源代码，否则将会被视为无效作业。

问题一：FizzBuzz

Problem Description

Imagine the scene. You are eleven years old, and in the five minutes before the end of the lesson, your Maths teacher decides he should make his class more “fun” by introducing a “game”. He explains that he is going to point at each pupil in turn and ask them to say the next number in sequence, starting from one. The “fun” part is that if the number is divisible by three, you instead say “Fizz” and if it is divisible by five you say “Buzz”. So now your maths teacher is pointing at all of your classmates in turn, and they happily shout “one!”, “two!”, “Fizz!”, “four!”, “Buzz!”… until he very deliberately points at you, fixing you with a steely gaze… time stands still, your mouth dries up, your palms become sweatier and sweatier until you finally manage to croak “Fizz!”. Doom is avoided, and the pointing finger moves on.

So of course in order to avoid embarassment infront of your whole class, you have to get the full list printed out so you know what to say. Your class has about 33 pupils and he might go round three times before the bell rings for breaktime. Next maths lesson is on Thursday. Get coding!

Write a program that prints the numbers from 1 to 100. But for multiples of three print “Fizz” instead of the number and for the multiples of five print “Buzz”. For numbers which are multiples of both three and five print “FizzBuzz “.

Sample output:

```
1
2
Fizz
4
Buzz
Fizz
7
8
Fizz
Buzz
11
Fizz
13
14
FizzBuzz
16
17
Fizz
```

```
19
Buzz
... etc up to 100
```

Stage 2 - new requirements

- A number is fizz if it is divisible by 3 or if it has a 3 in it
- A number is buzz if it is divisible by 5 or if it has a 5 in it

For exemple :

- 53 should return FizzBuzz (contain 5 and 3)
- 35 should return FizzBuzz (contain 3 and 5 and it divided by 5)

问题二：Bowling

Problem Description

Create a program, which, given a valid sequence of rolls for one line of American Ten-Pin Bowling, produces the total score for the game. Here are some things that the program will not do:

- We will not check for valid rolls.
- We will not check for correct number of rolls and frames.
- We will not provide scores for intermediate frames.

Depending on the application, this might or might not be a valid way to define a complete story, but we do it here for purposes of keeping the kata light. I think you'll see that improvements like those above would go in readily if they were needed for real.

We can briefly summarize the scoring for this form of bowling:

- Each game, or "line" of bowling, includes ten turns, or "frames" for the bowler.
- In each frame, the bowler gets up to two tries to knock down all the pins.
- If in two tries, he fails to knock them all down, his score for that frame is the total number of pins knocked down in his two tries.
- If in two tries he knocks them all down, this is called a "spare" and his score for the frame is ten plus the number of pins knocked down on his next throw (in his next turn).
- If on his first try in the frame he knocks down all the pins, this is called a "strike". His turn is over, and his score for the frame is ten plus the simple total of the pins knocked down in his next two rolls.
- If he gets a spare or strike in the last (tenth) frame, the bowler gets to throw one or two more bonus balls, respectively. These bonus throws are taken as part of the same turn. If the bonus throws knock down all the pins, the process does not repeat: the bonus throws are only used to calculate the score of the final frame.
- The game score is the total of all frame scores.

More info on the rules at: How to Score for Bowling (https://www.topendsports.com/sport/tenpin/scoring.htm)

Clues

What makes this game interesting to score is the lookahead in the scoring for strike and spare. At the time we throw a strike or spare, we cannot calculate the frame score: we have to wait one or two frames to find out what the bonus is.

问题三：Gilded Rose

Problem Description

Hi and welcome to team Gilded Rose. As you know, we are a small inn with a prime location in a prominent city ran by a friendly innkeeper named Allison. We also buy and sell only the finest goods. Unfortunately, our goods are constantly degrading in quality as they approach their sell by date. We have a system in place that updates our inventory for us. It was developed by a no-nonsense type named Leeroy, who has moved on to new adventures. Your task is to add the new feature to our system so that we can begin selling a new category of items. First an introduction to our system:

- All items have a SellIn value which denotes the number of days we have to sell the item
- All items have a Quality value which denotes how valuable the item is
- At the end of each day our system lowers both values for every item

Pretty simple, right? Well this is where it gets interesting:

- Once the sell by date has passed, Quality degrades twice as fast
- The Quality of an item is never negative
- “Aged Brie” actually increases in Quality the older it gets
- The Quality of an item is never more than 50
- “Sulfuras”, being a legendary item, never has to be sold or decreases in Quality
- “Backstage passes”, like aged brie, increases in Quality as it’s SellIn value approaches; Quality increases by 2 when there are 10 days or less and by 3 when there are 5 days or less but Quality drops to 0 after the concert

We have recently signed a supplier of conjured items. This requires an update to our system:

- “Conjured” items degrade in Quality twice as fast as normal items

Feel free to make any changes to the UpdateQuality method and add any new code as long as everything still works correctly. However, do not alter the Item class or Items property as those belong to the goblin in the corner who will insta-rage and one-shot you as he doesn’t believe in shared code ownership (you can make the UpdateQuality method and Items property static if you like, we’ll cover for you).

Source code

To Start, get source from Emily Bache github (https://github.com/emilybache/GildedRose-Refactoring-Kata/tree/main/python)

问题四：Todo List

使用 Flask 或 Django 框架开发一个具备完整 CRUD 功能的 Todo List Web 应用，需实现以下核心功能：

1. 任务增删改查（支持任务内容、完成状态管理）
2. 数据持久化存储（使用 ORM 操作数据库）
3. 动态前端交互（AJAX 请求处理、状态实时更新）

问题五：手写数字分类器

请使用 Python 编写一个基于 MNIST 数据集的手写数字分类器，要求模型在测试集上达到至少 95%的准确率。需包含以下核心功能：

1. 数据加载与预处理：使用 TensorFlow/Keras 内置的 MNIST 数据集，对图像数据进行归一化处理。
2. 模型构建：设计一个包含至少 1 个隐藏层的神经网络（允许使用 CNN 或全连接网络）。
3. 模型训练：使用合理的优化器和损失函数，训练轮数不超过 10 个 epoch。
4. 性能评估：输出测试集准确率，保留 4 位小数。
5. 模型保存：将训练好的模型保存为 HDF5 格式文件（mnist_model.h5）。