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LISTS, DICTIONARIES IN PYTHON PROGRAMMING LANGUAGE

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Annotation: This article provides detailed information about lists and dictionaries in the Python programming language. It explains these data types, their applications, key methods, and their role in practical programming. The article includes theoretical explanations, practical examples, and related problems.

Keywords: Python, lists, dictionaries, data types, programming, practical problems, theoretical information.

Introduction

The Python programming language is widely used among developers for its simple syntax and convenient functionality. One of the key aspects of this language is its data structures. Understanding and effectively utilizing data structures are crucial for building robust programs.

Lists and dictionaries are among Python's core data types, allowing data to be stored, processed, and managed efficiently. This article explores lists and dictionaries in depth, examines their characteristics, and demonstrates their use in programming through examples.

Theoretical Section

Lists

Lists in Python represent mutable, indexed, and ordered collections of data. A list can contain elements of different types.

Creating Lists:

```
my_list = [1, 2, 3, 4, 5]  # Integer elements
mixed_list = ["Python", 3.14, True]  # Elements of various types
```

Key Features:

Indexed: Each element can be accessed via its index (starting from 0).

Mutable: The values of elements can be changed or removed.

Unlimited Size: Lists can store any amount of data.

List Methods

append(): Adds a new element to the list.

remove(): Removes the element with the specified value.

pop(): Removes and returns the last element.

sort(): Sorts the list.

reverse(): Reverses the order of the list.

Example:

```
fruits = ["apple", "banana", "orange"]
```

```
fruits.append("pear")  # Adding a new element
print(fruits)  # ["apple", "banana", "orange", "pear"]
```

Dictionaries

Dictionaries store data as key-value pairs. Keys in a dictionary must be unique.

Creating a Dictionary:

```
my_dict = {"name": "Ali", "age": 25, "profession": "Developer"}
```

Key Features:

Unordered: Data is stored without any specific order.

Access via Keys: Data is accessed using keys.

Mutable: Dictionary contents can be modified.

Dictionary Methods:

get(): Returns the value associated with a key.

keys(): Returns a list of all keys.

values(): Returns a list of all values.

items(): Returns key-value pairs as tuples.

update(): Adds new elements or updates existing ones.

Example:

```
data = {"country": "Uzbekistan", "population": 35000000}
data["capital"] = "Tashkent"  # Adding a new element
print(data)
```

Practical Problems

Problem 1: Working with Lists

Problem: Find the largest and smallest elements in a given list.

Program:

```
def find_min_max(numbers):
min_val = min(numbers)
max_val = max(numbers)
return min_val, max_val
nums = [5, 12, 7, 3, 9]
min_num, max_num = find_min_max(nums)
print(f"Smallest: {min_num}, Largest: {max_num}")
```

Result:

Smallest: 3, Largest: 12

Problem 2: Working with Dictionaries

Problem: Create a dictionary to store students' grades and find the highest grade.

Program:

```
def highest_grade(students):
max_student = max(students, key=students.get)
return max_student, students[max_student]
grades = {"Ali": 87, "Vali": 92, "Hasan": 78}
```

```
best_student, best_grade = highest_grade(grades)
print(f"Best Student: {best_student}, Grade: {best_grade}")
```

Result:

Best Student: Vali, Grade: 92

Conclusion

Lists and dictionaries are widely used data types in Python programming. Lists allow managing ordered collections of data, while dictionaries are used to manage key-value pairs. This article highlighted the key characteristics of lists and dictionaries, their importance in practical programming, and problems solvable with these structures.

Understanding lists and dictionaries enhances a programmer's efficiency and helps in solving complex problems more effectively.

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