Lab Test – 02

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Course : AI Asiisted Coding

Batch : 05

Branch : CSE

Subgroup E
Scenario (sports analytics):
Context:
A legacy sports analytics script uses verbose loops to aggregate key-value tuples.
Your Task:
Refactor to a pythonic aggregation using dict.get or collections.defaultdict with type hints.
Data & Edge Cases:
Input example: [('a',1),('b',2),('a',3)] -> {'a':4,'b':2}.
AI Assistance Expectation:
Ask AI for refactor suggestions, then apply and ensure behavior parity via tests.
Constraints & Notes:
Type hints for function signatures required.
Sample Input
data=[('a',1),('b',2),('a',3)]
Sample Output

{'a':4,'b':2}
Acceptance Criteria: Behavior unchanged; improved readability
---
Prompt :
To refactor suggestions, then apply and ensure behavior parity via tests.

Code :

first.py > ...

```python
from typing import List, Tuple, Dict
from collections import defaultdict
# --- Option 1: Using dict.get ---
def aggregate_pairs_get(data: List[Tuple[str, int]]) -> Dict[str, int]:
    result: Dict[str, int] = {}
    for key, value in data:
        result[key] = result.get(key, 0) + value
    return result

# --- Option 2: Using collections.defaultdict ---
def aggregate_pairs_defaultdict(data: List[Tuple[str, int]]) -> Dict[str, int]:
    result: defaultdict[str, int] = defaultdict(int)
    for key, value in data:
        result[key] += value
    return dict(result)

# --- Tests to check behavior parity ---
def test_aggregate_pairs() -> None:
    test_cases = [
        ([('a', 1), ('b', 2), ('a', 3)], {'a': 4, 'b': 2}),          # normal case
        ([], {}),                                                    # empty input
        ([('x', 10)], {'x': 10}),                                    # single pair
        ([('z', 0), ('z', 0)], {'z': 0}),                            # zero values
        ([('a', -1), ('a', 1)], {'a': 0}),                           # negatives
    ]

    for data, expected in test_cases:
        assert aggregate_pairs_get(data) == expected
        assert aggregate_pairs_defaultdict(data) == expected

    print("✅ All tests passed")

# Run tests
if __name__ == "__main__":
    test_aggregate_pairs()
```

Output :

```
sgoll/OneDrive/Documents/New folder/first.py"
✅ All tests passed
```

Observation :

The refactored code demonstrates two Pythonic approaches for aggregating key–value tuples into a dictionary. The first approach (`aggregate_pairs_get`) uses `dict.get` to handle missing keys,

while the second (`aggregate_pairs_defaultdict`) leverages `collections.defaultdict` for cleaner handling of default values. Both implementations are type-hinted, concise, and maintain identical behavior. The test suite validates normal aggregation, empty inputs, single entries, duplicate keys with zero values, and handling of negative numbers. All test cases pass, confirming behavior parity between the two methods and ensuring robustness across common edge cases. Overall, the refactor improves readability, reliability, and clarity compared to verbose loop-based aggregation.

E.1 — [S09E1] Generate README from comments

Scenario (sports analytics):

Context:

A small sports analytics utility module needs a README for onboarding and CI.

Your Task:

From inline comments, produce a README with sections: Overview, Setup, Usage, Tests,

Limitations; include one CLI example.

Data & Edge Cases:

Comments mention module name and functions: parse, validate, export.

AI Assistance Expectation:

Use AI to draft the README and refine wording for clarity.

Constraints & Notes:

Ensure each section is present and concise.

Sample Input

module: sports analytics utilities

functions: parse, validate, export

Sample Output

README with 5 sections and example

Acceptance Criteria: Includes example CLI invocation

Prompt :

To draft the README and refine wording for clarity.

Code :

```python
from typing import List

def normalize(scores: List[float]) -> List[float]:
    """Normalize a list of numbers to the range [0, 1] using min-max scaling.

    Handles edge cases:
    - Empty lists return an empty list.
    - If all values are equal, returns a list of zeros of the same length.

    Args:
        scores (List[float]): A list of numeric values (ints or floats).

    Returns:
        List[float]: A list of normalized values in the range [0, 1].

    Examples:
        >>> normalize([10, 20, 30])
        [0.0, 0.5, 1.0]

        >>> normalize([5, 5, 5])
        [0.0, 0.0, 0.0]

        >>> normalize([])
        []

        >>> normalize([-2, 0, 2])
        [0.0, 0.5, 1.0]
    """
    if not scores:
        return []

    m = max(scores)
    n = min(scores)

    if m == n:
        return [0.0] * len(scores)

    return [(x - n) / (m - n) for x in scores]


if __name__ == "_main_":
    import doctest

    # Run doctests
    print("Running doctests...")
```

```
    doctest.testmod()
    print("All doctests passed!\n")

    # Demo usage
    my_scores = [10, 50, 85, 120]
    normalized_scores = normalize(my_scores)

    print("Demo:")
    print(f"Original:   {my_scores}")
    print(f"Normalized: {normalized_scores}")
```

Output :

```
PS C:\Users\Reshm\Desktop\AIAC> & "C:/Program Files/Python313/python.exe" c:/Users/Reshm/Desktop/AIAC/11.1.py

PS C:\Users\Reshm\Desktop\AIAC> Running doctests...
>> All doctests passed!
>>
>> Demo:
>> Original:   [10, 50, 85, 120]
>> Normalized: [0.0, 0.36363636363636365, 0.6818181818181818, 1.0]
```

Observation :

The normalize function:

Takes a list of numbers (scores) as input.

Uses min-max normalization to scale the values to the range [0, 1].

Handles important edge cases:

Empty list → returns []

All elements equal → returns list of 0.0s (since normalization would otherwise involve division by zero)