Diagonal Difference

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Editorial by vatsalchanana

We need to calculate the sums across the two diagonals of a square matrix. Along the first diagonal of the matrix, row index = column index. $A[i][j]$ lies on the first diagonal if $i = j$. Along the other diagonal, row index = n-1-column index. $A[i][j]$ lies on the second diagonal if $i == n - j - 1$ (0 based indexing). By using two for loops we can traverse the entire matrix and calculate the sums across the diagonals of the matrix.

Statistics

Difficulty: Easy
Time Complexity: $\mathcal{O}(N^2)$
Required Knowledge: 2D Arrays
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This is a Practice Challenge

Featured Solutions

C++++

```
#include <iostream>

using namespace std;

int main() {
    int n;
    cin >> n;

    int arr[n][n];

    long long int d1=0; //First Diagonal
    long long int d2=0; //Second Diagonal

    for (int i = 0; i < n; i++) {
        for (int j = 0; j < n; j++) {
            cin >> arr[i][j];
            if (i == j) d1 += arr[i][j];
            if (i == n - j - 1) d2 += arr[i][j];
        }
    }

    cout << abs(d1 - d2) << endl; //Absolute difference of the sums across the diagonals
    return 0;
}
```

Python

```
size = input()
matrix = []

# reading input
for _ in xrange(size):
    row = map(int, raw_input().split())
    matrix.append(row)

# initialize s1 for right diagonal and s2 for left diagonal
s1, s2 = 0, 0

# summing up together in just 1 loop, -ve index
# (-x) in python is actually (size - x)
for i in xrange(size):
    s1 += matrix[i][i]
    s2 += matrix[-i-1][i]

# printing absolute difference
print abs(s1 - s2)
```

Ruby

```
#!/bin/ruby
```

```
n = gets.strip.to_i
a = Array.new(n)
(0..n-1).each do |i|
    a[i] = gets.strip.split(' ').map(&:to_i)
end

d1 = 0
d2 = 0
(0..n-1).each do |i|
    d1 = d1 + a[i][i]
    d2 = d2 + a[-i-1][i]
end

print (d1-d2).abs
```

Javascript

```
function processData(input) {
    var lines = input.split("\n");
    var N = parseInt(lines[0]);
    var ans = 0;
    for(i = 1; i <= N; i++) {
        var line = lines[i].split(" ");
        ans += parseInt(line[i - 1]) - parseInt(line[N - i]);
    }
    console.log(Math.abs(ans));
}

process.stdin.resume();
process.stdin.setEncoding("ascii");
_input = "";
process.stdin.on("data", function (input) {
    _input += input;
});

process.stdin.on("end", function () {
   processData(_input);
});
```