

# C++ task

Your task is to write code which calculates feature similar to pennant (from [technical analysis](#)) over rolling window.

## Input

1. array of doubles that represents changes of some value over time (timeseries);
2. window size.

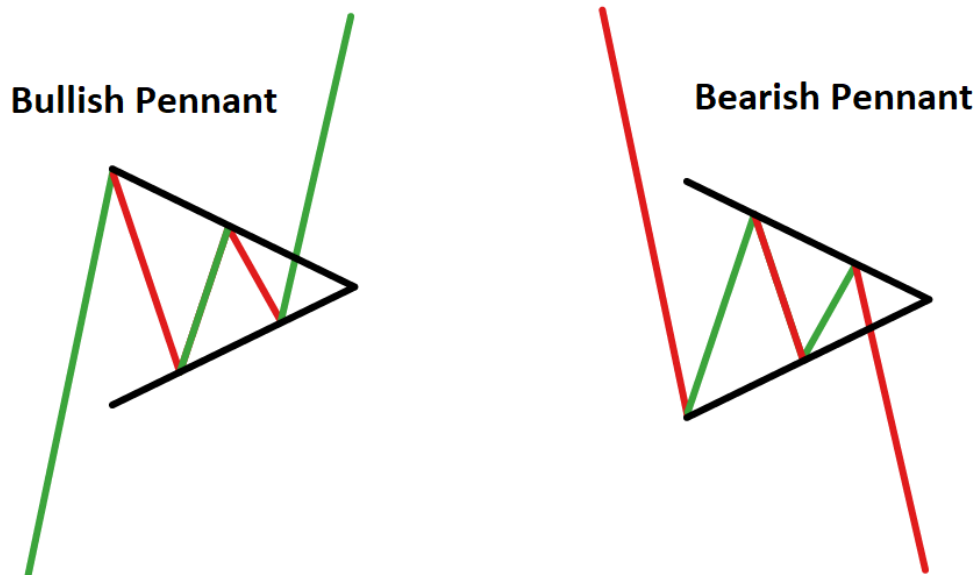
## Output

1. single array of calculated angles.

Examples of inputs are in the archive in the file `inputs.csv`, and outputs are in the files `window_*.csv`.

## How to calculate feature?

Here is how pennant looks in technical analysis:



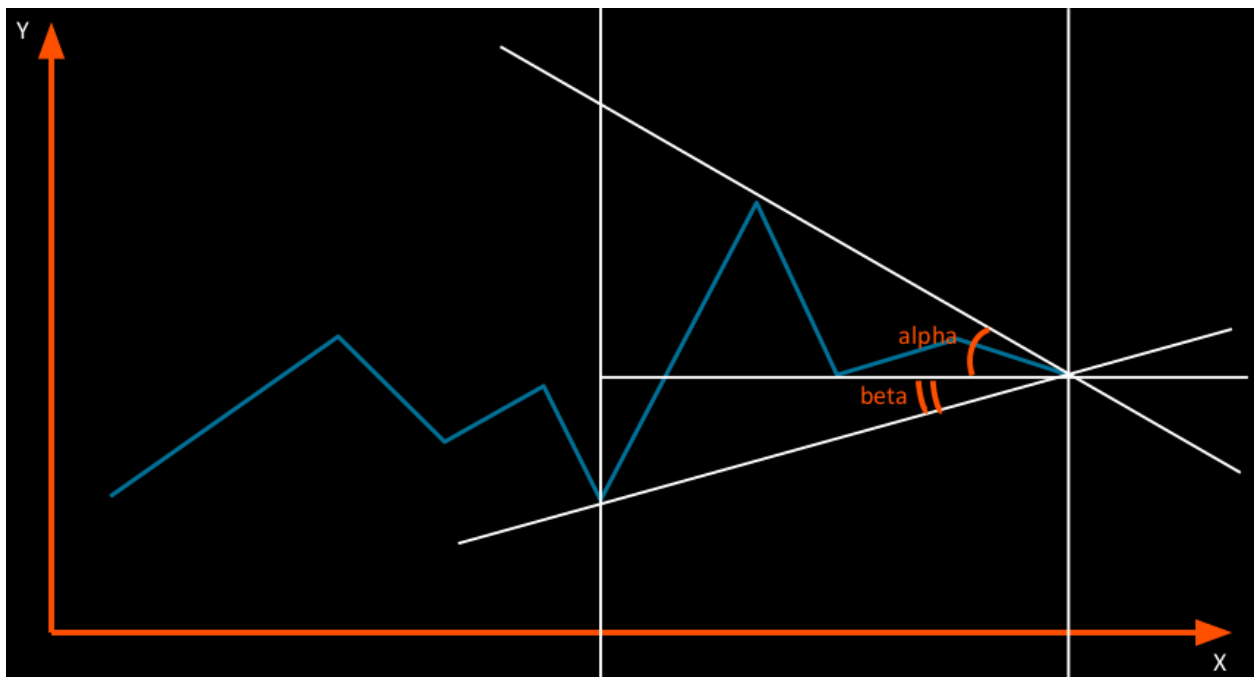
At each timepoint you need to determine the slope angles (alpha and beta) of the two tangents passing through the last point in the sliding window, which completely cover the graph of the value in the window.

## Rules

1. Angles must be in radians.
2. The distance on the x axis between neighboring points is always equal to one.
3. If the window consists of a single point, the angles should be considered equal to zero.
4. The size of the output array must match the size of the input array.
5. The format of input and output files is CSV (without header, comma separated).

## Example

Below is the graph of 9 points and tangents from the last point for sliding window 5:



In this example  $\alpha > 0$  and  $\beta < 0$ .

## Code template

C/C++

```
#include <vector>

struct Angles {
    double alpha{0};
    double beta{0};
};

void calculate(const std::vector<double> &inputs, std::vector<Angles> &result,
int window)
{
    // TODO: implement
}

int main()
{
    std::vector<double> inputs(100000);
    // read inputs
    std::vector<Angles> outputs;
    outputs.reserve(inputs.size());
    calculate(inputs, outputs, 10);
    // write outputs
    return 0;
}
```