Filtrado Mediana

swap

```
1  void swap(vector<int> &w, int i, int j) {
2      int aux = w[i];
3      w[i] = w[j];
4      w[j] = aux;
5  }
```

c_1	1
c_2	1
c_3	1

- $m = |w|$

- $T_{swap}(m) = c_1 + c_2 + c_3$

- $T_{swap}(m) \in O(1)$

insert

```
1  void insert(vector<int> &w, int i) {
2      int j = i;
3      while (j > 0 && w[j] < w[j - 1]) {
4          swap(w, j, j - 1);
5          j--;
6      }
7  }
```

c_1'	1
c_2'	$m+1$
c_3'	m
c_4'	m

- $m = |w|$

- $T_{insert}(m) = c_1' + c_2' \cdot (m+1) + c_3' \cdot m + c_4' \cdot m$

- $T_{insert}(m) \in O(m)$

insertionSort

```
1  void insertionSort(vector<int> &w) {
2      int i = 0;
3      while (i < w.size()) {
4          insert(w, i);
5          i++;
6      }
7  }
```

c_1''	1
c_2''	$m+1$
$c_3'' \cdot m$	m
c_4''	m

- $m = |w|$

- $T_{insertSort}(m) = c_1'' + c_2'' \cdot (m+1) + c_3'' \cdot m^2 + c_4'' \cdot m$

- $T_{insertSort}(m) \in O(m^2)$

posicionROrdenada

```
1  int posicionROrdenada(vector<int> w, int R) {
2      insertionSort(w);
3
4      return w[R];
5  }
```

$c_1'''' \cdot m^2$	1
c_2''''	1

- $m = |w|$

- $T_{posicionROrdenada}(m) = c_1'''' \cdot m^2 + c_2''$

- $T_{posicionROrdenada}(m) \in O(m^2)$

filtradoMediana

```cpp
void filtradoMediana(senial &s, int R, int prof, int freq) {
    int largoDeW = (2 * R) + 1;
    vector<int> w(largoDeW, 0);

    int j = largoDeW - 1;
    while (j >= 0) {
        w[j] = s[j];
        j--;
    }

    int i = R;
    int fin = s.size() - R;
    while (i < fin) {
        if (i != R) {
            w[(i - R - 1) % largoDeW] = s[i + R];
        }
        s[i] = posicionROrdenada(w, R);
        i++;
    }
}
```

c_1''''	1
c_2''''	m
c_3''''	1
c_4''''	$m+1$
c_5''''	m
c_6''''	m
c_7''''	1
c_8''''	1
c_9''''	$n-m+1$
c_{10}''''	$n-m$
c_{11}''''	$n-m-1$
$c_{12}'''' \cdot m^2$	$n-m$
c_{13}''''	$n-m$

- $m = (2 * R) + 1 \wedge n = |s|$

- $T_{filtradoMediana}(n) = c_1'''' + c_2'''' \cdot m + c_3'''' + c_4'''' \cdot (m+1) + c_5'''' \cdot m + c_6'''' \cdot m + c_7'''' + c_8'''' + c_9'''' \cdot (n-m+1) + c_{10}'''' \cdot (n-m) + c_{11}'''' \cdot (n-m-1) + c_{12}'''' \cdot m^2 \cdot (n-m) + c_{13}'''' \cdot (n-m)$

- $T_{filtradoMediana}(n) \in O(m^2 \cdot (n-m))$

- $m \in [5,9]$

- $T_{filtradoMediana}(n) \in O(n)$