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

```
1  void filtradoMediana(senial &s, int R, int prof, int freq) {
2      int largoDeW = (2 * R) + 1;
3      vector<int> w(largoDeW, 0);
4
5      int j = largoDeW - 1;
6      while (j >= 0) {
7          w[j] = s[j];
8          j--;
9      }
10
11     int i = R;
12     int fin = s.size() - R;
13     while (i < fin) {
14         if (i != R) {
15             w[(i - R - 1) % largoDeW] = s[i + R];
16         }
17         s[i] = posicionROrdenada(w, R);
18         i++;
19     }
20 }
```

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}''''	$n-m$

- $m = (2 * R) + 1 \land n = |s|$
- $T_{filtradoMediana}(m,n) = c_1'''' + c_2'''' \cdot m + c_3'''' + c_4'''' \cdot (m+1) + c_5'''' \cdot m + c_6'''' \cdot m + c_7'''' + c_8'''' + c_9'''' \cdot (n-m+1) + c_{10}'''' \cdot (n-m) + c_{11}'''' \cdot (n-m-1) + c_{12}'''' \cdot m^2 \cdot (n-m) + c_{13}'''' \cdot (n-m)$
- $T_{filtradoMediana}(m,n) \in O(m^2 \cdot (n-m))$
- $m \in [5,9]$
- $T_{filtradoMediana}(m,n) \in O(n)$