Cicli innestati

Wed, 23 Mar

Valutazione dei Tempi di Esecuzione di un Algoritmo con Cicli innestati

- **Pseudocodice** dell'algoritmo

```
int f(h)
begin
    r = 0                              c · 1
    for i = 1 to n-1                   c · (n-1)
    begin
        for j = i+1 to n               c · ∑(i=1 → n-1) n-1
        begin
            for k = 1 to j             c · ∑(i=1 → n-1) (∑(j=i+1 → n) j)
            begin
                r++                    c · ∑(i=1 → n-1) (∑(j=i+1 → n) j)
            end
        end
    end
    return r                           c · 1
end
```

- Formula per il calcolo delle **operazioni**

$$
\begin{aligned}
&Tf(n) = 2c + c(n-1) + c\sum(i=1 \to n-1)(n-1) + 2c(\sum(i=1 \to n-1)(\sum(j=i+1 \to n)j))\\
&\approx 2c + cn + c\sum(i=1 \to n-1)(i) + 2c\sum(i=1 \to n-1)(\sum(j=1 \to n)(j) - \sum(j=1 \to \mathrm{i})(j))\\
&\approx 2c + cn + (n(n-1))/2 + 2c\sum(i=1 \to n-1)((n(n-1))/2 - (i(i+1))/2))\\
&\approx 2c + cn + cn^2/2 + 2c(1/2)\sum(i=1 \to n-1)(n^2 - n - i^2 - i)\\
&\approx 2c + cn + cn^2/2 + c((n-1)(n^2) - (n)(n-1) + \sum(i=1 \to n-1)(-i^2) - \sum(i=1 \to n-1)(i))\\
&\approx 2c + cn + cn^2/2 + cn^3 - cn^2 - c\sum(i=1 \to n-1)(-i^2) - \sum(i=1 \to n-1)(i))\\
&\approx 2c + cn + cn^2/2 + cn^3 - cn^2 - c((n-1)(n)(2(n-1)+1))/6 - ((n-1)(n))/2\\
&\approx 2c + cn - acn^2/2 + 5cn^3/6 \approx \Theta(n^3)
\end{aligned}
$$