# *Algorithm For Monitoring And Preventing Coffee Rust*

***Simón Marín Giraldo***
***Miguel Fernando Ramos García***
*Medellín, October 29, 2019.*

# Designed Data Structure

*Inserten sus gráficas vectorizadas que explican su Estructura de Datos*


***Gráfico 1:*** Lista simplemente encadenada de personas. Una persona es una clase que contiene nombre, cédula y foto.

*Escriban sus propias palabras para describir sus gráficas*

# Data Structure Operations

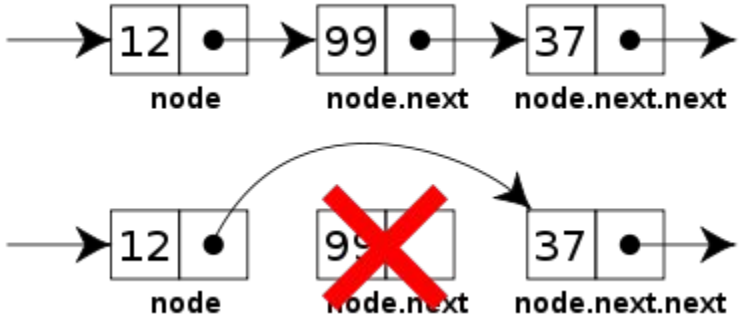


**Gráfico 2:** Operación de borrado de una estructura de datos

| Operation | Complexity |
|---|---|
| leerArchivo(String data) | $O(n^2)$ |
| seleccionarDataset() | O(n) |
| llenarMatriz(double [][] matriz) | $O(n^2)$ |
| llenarImpureza(double [][] matriz) | $O(n^2)$ |
| menores(double [][] matriz) | O(n) |
| addChild(Node childNode, int position) | O(1) |
| addNewNode(Node u, Object info, int i) | O(1) |
| numberOfNodesInTree(Node rootNode) | O(n) |

**Table 1:** Table to report complexity analysis

# *Design Criteria of the Data Structure*

- AVL decision trees are good for sorting, searching and storing big volumes of data with a low Big-O complexity.
- CART (Classification And Regression Tree) algorithm is a good decision tree implementation which can be easily managed recursively. It provides a clear and simple comprehension of the structures that are being created which filter and classify the data.

# *Time and Memory Consumption*

| Operation | Execution time |
|---|---|
| leerArchivo(String data) | 0.0ms |
| seleccionarDataset() | 0.0ms |
| llenarMatriz(double [][] matriz) | 0.0ms |
| llenarImpureza(double [][] matriz) | 0.0ms |
| menores(double [][] matriz) | 0.0ms |
| addChild(Node childNode, int position) | 0.0ms |
| addNewNode(Node u, Object info, int i) | 0.0ms |
| numberOfNodesInTree(Node rootNode) | 0.0ms |

**Table 2:** Execution time of the operations of the data structure for each data set..

| Data set | Memory used |
|---|---|
| data_set.csv | 7.84 MB |
| data_set_balanced.csv | 7.0 MB |
| data_set_train.csv | 6.84 MB |
| data_set_test.csv | 6.56 MB |

**Table 3:** Memory used for each operation of the data structure and for each data set.