

## Introduction

It is a common belief that smoking conventional tobacco cigarettes is very harmful and provokes many serious diseases to the smokers [1]. This is due to the products of combustion of the ingredients of tobacco, filter and paper of conventional tobacco cigarettes [2]. Many different tobacco cigarettes are commercialized. Many of them have the same ingredients, but in different contents, while others contain different ingredients in different contents. For this reason, there is probably a relationship between the different ingredients and their quantities that makes the cigarette more attractive.

In this work we performed the categorization of the cigarette ingredients into the three different groups (tobacco, filter and paper) by using the KNIME Analytics Platform.

## Methods

The KNIME Analytics Platform is an open source software for data science. According to this Platform, we are able to design flow charts by using the proper nodes in order to export more information by data mining.

The files published in the website of the French Agency ANSES [3] include many information concerning the physical and chemical characteristics of the cigarettes notified in the French market. The flow chart begins by the node that reads the input (excel) files. Then, by the node Row Splitter, the rows that do not refer to the conventional cigarette (ex. pipe, cigarillos ext.) are excluded. Also, some columns which are not relevant to the purpose of this work are excluded, using the Column Filter. In order to categorize the cigarette ingredients into three groups, we used some keywords to separate the ingredients into categories (Tobacco, Filter and Paper ingredients) by the node Nominal Value Row Filter. Finally, all the duplicates of the ingredients are excluded and the ingredients are appeared into alphabetical order by using in a row the nodes Duplicate Row Filter and Sorter.

According to this flow chart (Figure 1), we are able to find the total number of the ingredients of each category and their names.

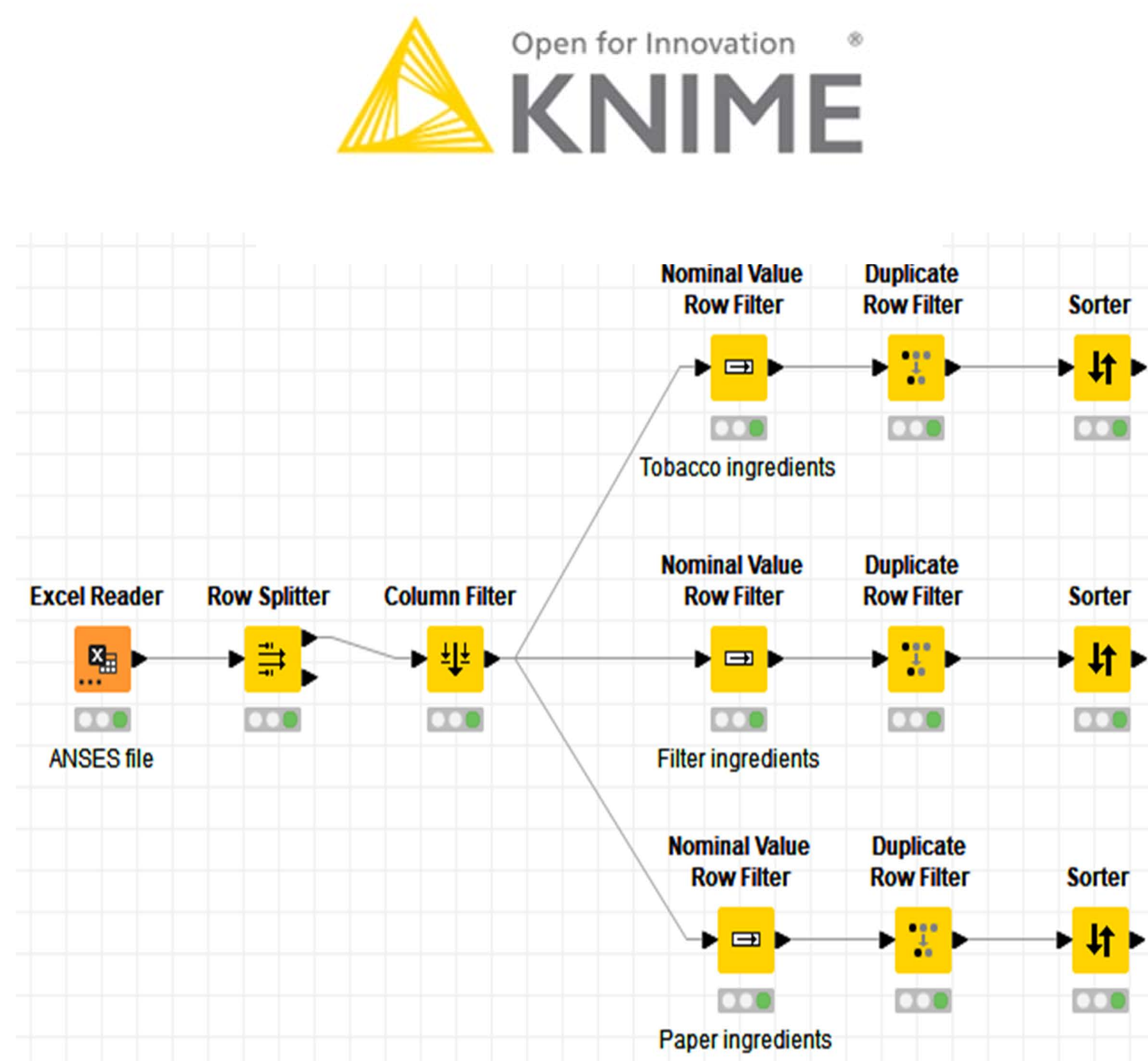


Figure 1. The flow chart in KNIME Analytics Platform.

## Conclusions

The KNIME Analytics Platform was used in the data of the conventional cigarettes in French Tobacco Market. The conventional cigarette rod consists of three different parts, the tobacco, the filter and the paper. Each of them includes some ingredients. 24 different ingredients belong to the tobacco group, while 15 and 12 ingredients were found in the filter and the paper, respectively.

Using this Platform, the treatment of a big amount of data is quite easy, as shown in the study of the ingredients in conventional cigarette.

## Results

The application of this flow chart in the data of the conventional cigarettes circulated in Tobacco French Market gave the following results (Table 1):

TABLE 1	
ALCOHOLIC BEVERAGES (RUM, EXT., NONALC.)	LACTIC ACID
BENZYL ALCOHOL	LICORICE (EXTRACT, FLUID, POWDER, ROOT EXTRACT, POWDER EXTRACT)
CALCIUM CARBONATE	MAPLE SYRUP
CAROB BEAN (EXTRACT, POWDER, OLEORESIN)	MENTHOL
CELLULOSE (FIBRE, PULP)	PLUM (EXTRACT, JUICE, CONCENTRATE)
COCOA (EXTRACT, MASS, SHELLS, POWDER, BUTTER)	PROPYLENE GLYCOL
FIG EXTRACT	PRUNE (JUICE CONCENTRATE)
FRUCTOSE SYRUP	RAISIN (CONCENTRATE, EXTRACT)
GLUCOSE SYRUP	SODIUM CITRATE
GLYCEROL	SUCROSE AND/OR SUCROSE SYRUP
GUAR GUM	SUGARS (HYDROLYZED STARCH SYRUP)
INVERT SUGAR (SYRUP)	WATER (PURIFIED, AND/OR DISTILLED AND/OR DEIONIZED AND/OR MINERAL)

Table 1. The 24 ingredients included in the tobacco of the conventional cigarettes in French Tobacco Market.

TABLE 2	
ACTIVATED CARBON	LUBRICANT WHITE MINERAL OIL
CALCIUM CARBONATE	MAGNESIUM OXIDE
CELLULOSE (FIBRE OR/AND PULP)	MEDIUM CHAIN TRIGLYCERIDES
CELLULOSE ACETATE	MENTHOL
CELLULOSE DIACETATE	POLYVINYL ACETATE
COPOLYMER OF VINYLACETATE AND ETHYLENE	VISCOSE FIBER
ETHYLENE VINYL ACETATE COPOLYMER	WATER, PURIFIED, AND/OR DISTILLED AND/OR DEIONIZED AND/OR MINERAL
GLYCEROL TRIACETATE	

Table 2. The 15 ingredients included in the filter of the conventional cigarettes in French Tobacco Market.

TABLE 3	
ACACIA GUM	KAOLIN
ALUMINUM SILICATE	POTASSIUM CITRATE
CALCIUM CARBONATE	STARCH OXIDISED
CELLULOSE FIBER OR PULP	TITANIUM DIOXIDE
ETHYLENE VINYLACETATE COPOLYMER EMULSION OR DISPERSION	TRIACETIN
GLYCERYL TRIACETATE	WATER

Table 3. The 12 ingredients included in the paper of the conventional cigarettes in French Tobacco Market.

## References

1. Kotzias D, Geiss O, Institute for Health and Consumer Protection. Tobacco, Cigarettes and Cigarette Smoke: An Overview. Publications Office; 2007
2. Carmines E, Evaluation of the potential effect of ingredients added to cigarettes. Part 1: Cigarette design, testing approach, and review of results, Food and Chemical Toxicology, 40 (1), pp 77-91, 2002
3. ANSES 2021, Data of tobacco products, <https://www.anses.fr/en/content/tobacco-and-related-products>, retrieved 14/01/2021