**Problem Statement**

* The notebooks explores the basic use of **Pandas** and will cover the basic commands of **(Data Gathering)** for analysis purpose.
* **In this study**, we will try to see if we can explore the **Metalorgy of elements** and it's price based on different features. The features are different (**Chemical Nature**,Physical properties,Nature of Element...).

**Data Gathering**

**. By Web Scraping**

* Collecting data about the prices of each element in the **periodic table** from URL: <http://www.leonland.de/elements_by_price/en/list> using **BeautifulSoup package**

**. From Kaggle**

* Data from Kaggle: <https://www.kaggle.com/datasets/psycon/periodic>

**EDA & Cleaning**

* **In this study**, we will try to see if we can explore the **Metalorgy of elements** and it's price based on different features. The features are different (**Chemical Nature**,Physical properties,Nature of Element...).
* The variables of the dataset are the following:
  + **Categorical**: ['Element','Symbol','Phase','Radioactive','Natural','Metal','Nonmetal','Metalloid','Type','Discoverer']
  + **Date**: ‘Year of element descoverinf’
  + **Numerical**:['AtomicNumber', 'AtomicMass', 'NumberofNeutrons', 'NumberofProtons', 'NumberofElectrons', 'Period', 'Group', 'AtomicRadius', 'Electronegativity', 'FirstIonization', 'Density', 'MeltingPoint', 'BoilingPoint', 'NumberOfIsotopes', 'SpecificHeat', 'NumberofShells', 'NumberofValence']
  + **Target**:‘’The price of **Metal Elements Variation** based on their properties ’
* There are [118 row(elements)] & [35 column==>some of them is to drop] lets go to **Explore** them
* There are some **missing values** to handling as we **need** not to removing
* No douplicated values

**Data Cleaning**

**. Nall values Handling**

* We can Fill The **Missing Values** of **Numerical Columns** with==> ('0.0') & **Categorical Columns** with==>('undefined') Accordding To:
  + Lanthanides and Actinides elements are under **Discovery**.
  + Some elements exhibit changes in physical properties that affect their chemical properties.
  + Some elements have not been confirmed for their physical and chemical properties.

Certain elements exhibit changes in their chemical properties as a result of alterations in their physical properties. For example, when elements undergo a phase change, such as going from solid to liquid or liquid to gas, they often display differences in their chemical reactivity or behavior. One example of this is water (H2O), which remains chemically the same but exhibits different physical properties as it transitions from solid ice to liquid water to gaseous vapor

* **['Metal','Nonmetal','Metalloid']** ==> is to concate as a one column with name **[ChemicalNature]**
* ['Metal','Nonmetal','Metalloid'] ==> is to drop after concate them to a **[ChemicalNature]** column

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**Data Analysis & visulization**

* Proparties:
  + **Physical Properties**: [AtomicMass, Number of Neutrons, Number of Protons, Number of Electrons, Period, Group, Phase, Density, Melting Point,Boiling Point, Number Of Isotopes,Specific Heat, Number of Shells]
  + **ChemicalNature**: [Radioactive, Natural, Type, Atomic Radius,Electronegativity, First Ionization ,Number of Valence]
    - The distinction lies in how these properties relate to the behavior, structure, and composition of the elements. Those classified as physical properties are primarily concerned with the state of matter, mass, and energy exchange, while the chemical properties focus on atomic and molecular interactions, reactivity, and atomic structure.

**Topics Of Analysis & Visualization**

* Types of Metal Elements
* Phase of Metal Elements
* Correlation of Features
* Metal Elements: Features highly correlated With it's Type
* Price of Transition Metals
* Metals Price vs [Atomic Mass, Number of Neutrons, Number of Electrons | Protons]
* Metals Price vs [Melting Point, Boiling Point]
* Transition Metals Price vs [Electronegativity, First Ionization, Density]