Algorithm

Import Libraries:

- Import necessary libraries including numpy, pandas, sklearn for various imputation techniques, fancyimpute for SoftImpute, matplotlib and seaborn for visualization, and other utilities.

Read and Prepare Data:

- Load the dataset using pandas.
- Drop specific non numerical columns: ['Gender', 'Email_Opt_In', 'Promotion_Response', 'Target_Churn', 'Age'].
- Create a copy of the dataset named data10A for 10% missing data.

Introduce Missing Values:

- Select 10% of the rows randomly in data10A.
- Introduce missing values (set to NaN) in these rows for 10% of data

Identify Missing Value Positions:

- Store the positions of the missing values.

Initialize Imputers:

- Initialize various imputation methods: KNN, IterativeImputer, SimpleImputer (mean and median), and SoftImpute.

Define RMSE Calculation Function:

- Create a function calculate_rmse to calculate the Root Mean Squared Error (RMSE) between the original and imputed values at missing positions.

Define Ensemble Imputation Function:

- Create a function ensemble_impute to perform imputation using an ensemble of different methods:
    - For each missing value position, impute using each method (KNN, Iterative, Mean, SoftImpute, Median).
    - Calculate RMSE for each method.
    - Select the method with the lowest RMSE and use it to impute each value.

Perform Imputations:

- Apply the ensemble imputation method.
- Apply individual imputation methods (KNN, Iterative, Mean, SoftImpute, Median).

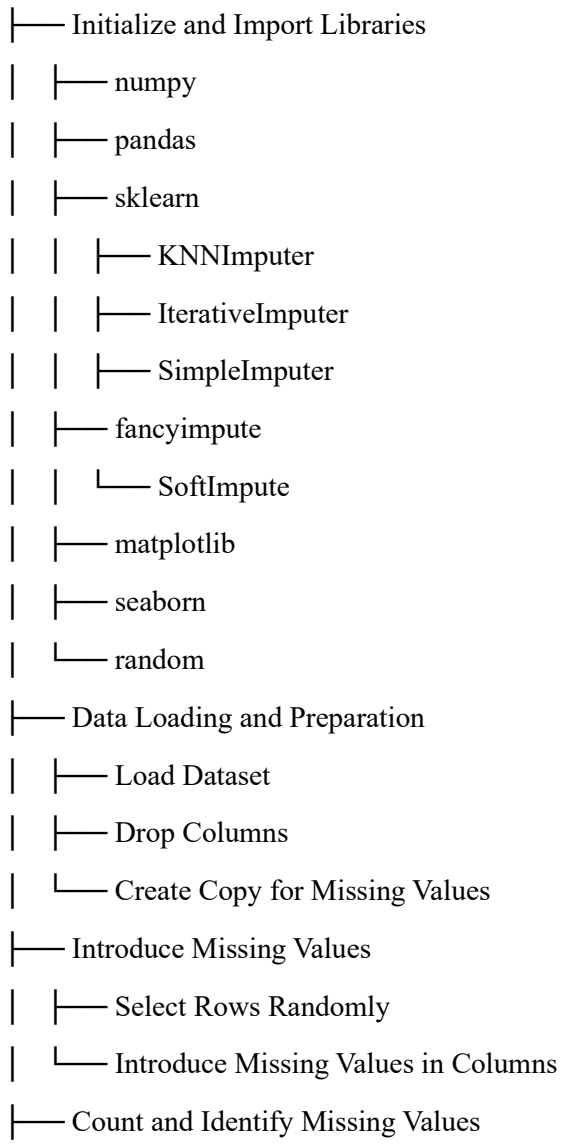
Calculate RMSE for Each Method:

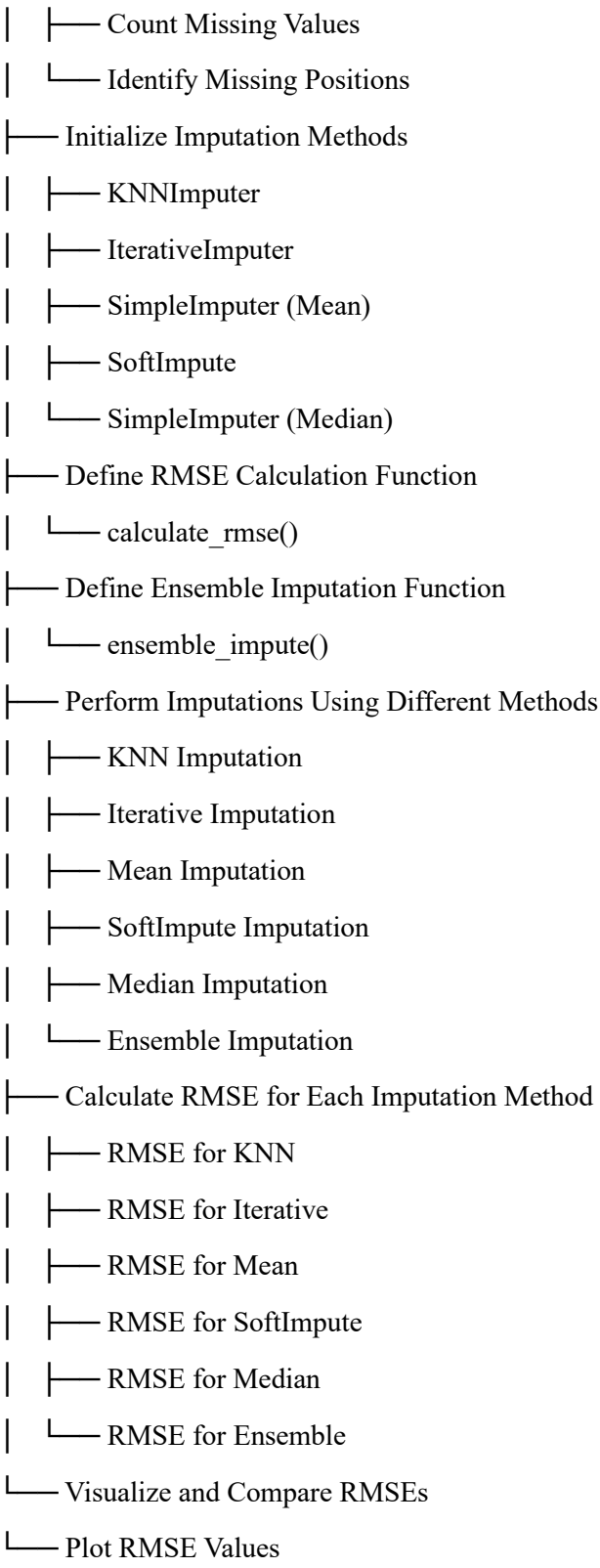
- Calculate the RMSE for the imputed datasets obtained from each method.

Visualize RMSE Comparison:

- Plot the RMSE values for each imputation method using a bar chart to compare their performance.

Algorithm Root




Count Missing Values
Identify Missing Positions
Initialize Imputation Methods
KNNImputer
IterativeImputer
SimpleImputer (Mean)
SoftImpute
SimpleImputer (Median)
Define RMSE Calculation Function
calculate_rmse()
Define Ensemble Imputation Function
ensemble_impute()
Perform Imputations Using Different Methods
KNN Imputation
Iterative Imputation
Mean Imputation
SoftImpute Imputation
Median Imputation
Ensemble Imputation
Calculate RMSE for Each Imputation Method
RMSE for KNN
RMSE for Iterative
RMSE for Mean
RMSE for SoftImpute
RMSE for Median
RMSE for Ensemble
Visualize and Compare RMSEs
Plot RMSE Values