

User Manual for VAR Sales Model developed in Python

(found at: <https://github.com/igormayor7/Sales-Model>)

The model works best when running Windows (preferably 10 or 11). Some troubleshooting may occur when run on Mac OS.

Necessary steps in order to be able to run the Model

- Download Visual Studio Code at the following link:
<https://code.visualstudio.com/Download>
- Download the latest version of Python at the following link:
<https://www.python.org/downloads/>
- Install the latest version of Anaconda at the following link:
<https://www.anaconda.com/products/distribution>
- Follow instructions presented at the following link to run Python and Anaconda on VSCode:
<https://code.visualstudio.com/docs/python/python-tutorial>
- Once all the packages are downloaded and installed, find the model at the following link:
<https://github.com/igormayor7/Sales-Model>

Data Preparation

In order for the code to run properly, the data files selected in the first step need to be of the format presented below.

Selling In:

Date	Customer Code	Item Code	Selling In
2016-01-01	1913	60044011	15
2016-01-01	3489	60044011	10

Where Row 1 of the Excel Sheet contains names of the columns and date is in the following format: *yyyy-mm-dd* (unless changed in line 162 of the source code).

Selling Out:

Date	Selling Out	Item Code
01/03/2016	705.45	61197011
01/10/2016	4576.67	61197011

Where Row 1 of the Excel Sheet contains names of the columns and date is in the following format: *mm/dd/yyyy* (unless changed in line 127 of the source code).

For both datasets:

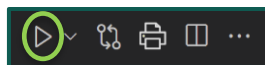
- It is important to keep the same names of columns as above
- The order of the entries doesn't matter
- All missing and non-numerical values must be removed and replaced with 0s

Convert these datasets into csv format on the following link or through another verified xls to csv converter:

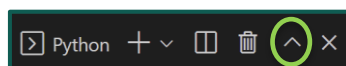
<https://convertio.co/xls-csv/>

Running the Model in VSCode

1. Open the model source code in VSCode and Run by pressing the play button in the top right corner (shown below)

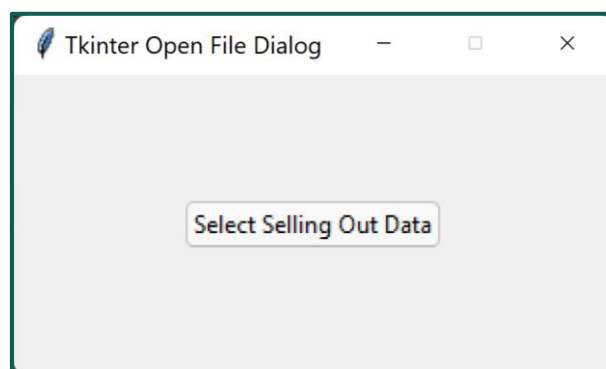


2. If not automatically done, open the output console to full screen by pressing the upward arrow in the top left corner of the output (shown below)



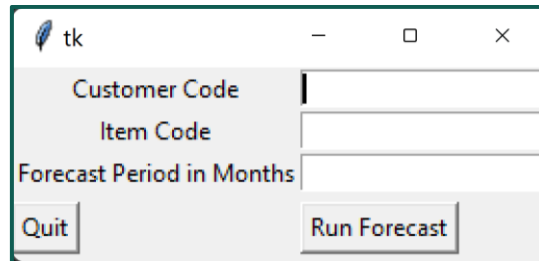
Model Instructions

1. The following window should appear first for Selling Out then for Selling In



Click “Select Selling Out/In Data” which should open file explorer on your computer. Chose the converted csv file and click “Open”.

2. Once both data files are selected, the window below should pop-up



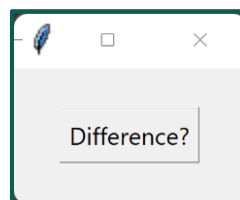
A Tkinter window titled 'tk' with a standard macOS-style title bar (red, yellow, green buttons). It contains three text input fields stacked vertically, labeled 'Customer Code', 'Item Code', and 'Forecast Period in Months'. At the bottom left is a 'Quit' button, and at the bottom right is a 'Run Forecast' button.

Here, enter the desired numeric **Customer Code**, **Item Code** and **Forecast Period** (in months). It is important to note that longer forecast periods are often more distorted and inflated (6 to 12 months is ideal but works outside this range as well in most cases).

3. Once entered, click “Run Forecast”.

The entries will all be shown in the output window. The graphs will appear in pop up windows and can be saved by pressing the save (floppy disk) button in the menu on top.

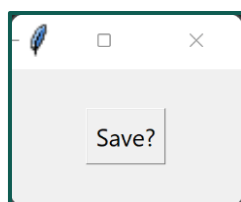
4. If the window below appears, click on “Difference?” button. It is suggested to select ‘Yes’ in the following prompt window for statistical reasons discussed in the paper.



A small dialog box with a title bar and a single button labeled 'Difference?'.

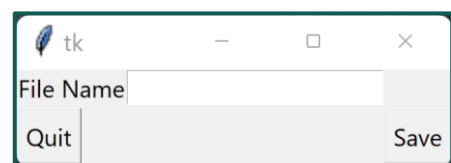
The model will then produce forecast values that will be printed in the output. The final graph shows the predicted values of Selling In and Selling Out for the desired period. Both time series are printed in full in the output.

5. “Save?” button should appear now.



A small dialog box with a title bar and a single button labeled 'Save?'.

6. When ‘Yes’ is selected, enter the desired file name and press “Save”.

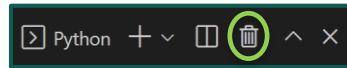


A Tkinter window titled 'tk' with a standard macOS-style title bar. It contains a text input field labeled 'File Name'. At the bottom left is a 'Quit' button, and at the bottom right is a 'Save' button.

Possible Problems and Solutions

1. If an error message saying “ValueError: Inferred frequency None from passed values does not conform to passed frequency MS” is printed, try putting # in front of line 225 of the source code.
2. If an error occurs and previously an “Empty DataFrame” line is printed, an incorrect customer/item code was selected or there is no past data available about the customer/item.

3. If the VSCode output window is empty even though pop-up windows appear, press the trash can button (shown below) and try re-running the model. If the error persists, use troubleshooting guides found on VSCode website linked above.



Useful Additions to the Model

1. A data file with all Selling In forecasts for a given customer can be made.
2. If no user confirmation for differencing is wanted, delete lines 442-451 & 638-650 of the source code.
3. The model can be configured to use more than just two datasets in order to improve predictive accuracy. Similar logic to the already existing data cleaning and merging process can be applied. The final dataset (given correct format) should still work for the model even if it contains more than 2 variables.

For any additional questions or information, feel free to contact me at mayorcking@gmail.com