

MIMIC III Tableau Visualization Assignment

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Importing Data and Connecting to Tableau

1. Download MIMIC III data from <https://physionet.org>
2. The tables Patients, Admissions, Procedures, Prescriptions, ICU Stays, Diagnosis, Lab events are connected to Tableau by clicking on Connect-> File -> Patients.csv
3. The tables are integrated by giving relations using the primary value in each table. In this case, it is Subject id. In procedures, it is row id.

The screenshot displays the Tableau interface for connecting and integrating data sources. On the left, the 'PATIENTS' data source is selected, showing a list of available files. The 'Files' section includes a checkbox for 'Use Data Interpreter' and a list of CSV files: ADMISSIONS.csv, CAREGIVERS.csv, D_ICD_DIAGNOSES.csv, D_ICD_PROCEDURES.csv, DATETIMEEVENTS.csv, DIAGNOSES_ICD.csv, ICUSTAYS.csv, LABEVENTS.csv, PATIENTS.csv, PRESCRIPTIONS.csv, PROCEDURES_ICD.csv, SERVICES.csv, and TRANSFERS.csv. Below the list are options for 'New Union' and 'New Table Extension'.

On the right, a relationship diagram shows 'PATIENTS.csv' connected to 'ADMISSIONS.csv', 'DIAGNOSES_ICD.csv', and 'ICUSTAYS.csv'.

Below the diagram, the 'PATIENTS... — ADMISSIO...' relationship is selected, showing the join configuration. The 'PATIENTS.csv' table is joined to the 'ADMISSIONS.csv' table using the 'Subject Id' field from 'PATIENTS.csv' and the 'subject id (ADMI' field from 'ADMISSIONS.csv'.

Below the join configuration, a table shows the resulting data rows:

#	PATIENTS.csv	#	PATIENTS.csv
Row Id	Subject Id	Row Id	Subject Id
9467		9467	
9472		9472	
9474		9474	

Creating Calculated fields

After importing the data, create a calculated field called Age by right clicking on patients.csv and select “Create Calculated field”. A tab will open. Follow the figure on the right to create the field. Here, I have divided the patients into different age groups.

The screenshot shows the Tableau Desktop interface with the 'Tableau - Mimic Tableau_Hari' window. The 'Data' pane on the left shows the 'PATIENTS' table selected, with fields like 'age group', 'Dob', 'Dod', 'Dod Hosp', 'Dod Ssn', 'Gender', 'Row Id', 'Subject Id', 'AGE', 'Expire Flag', and 'PATIENTS (Co...)' listed. The 'Marks' card is set to 'Automatic'. The 'Filters' card shows 'age group' as a filter. The 'Columns' shelf is empty. The 'Rows' shelf is empty. The 'Marks' card is set to 'Automatic'. The 'Color' and 'Size' properties are set to 'Automatic'. The 'Detail' and 'Tooltip' properties are set to 'Automatic'. The 'age group' calculated field is shown in the 'Columns' shelf. The calculated field definition is displayed in a pop-up window:

```
IF [AGE] <= 10
THEN 'Children'
ELSEIF [AGE]>10 AND [AGE]<=26
THEN 'GenZ'
ELSEIF [AGE]>26 AND [AGE]<=42
THEN 'Millennials'
ELSEIF [AGE]>42 AND [AGE]<=58
THEN 'GenX'
ELSEIF [AGE]>58 AND [AGE]<=77
THEN 'Boomers'
ELSEIF [AGE]>77 AND [AGE]<=95
THEN 'Post War'
ELSEIF [AGE]>95
THEN 'WW II'
END
```

A message at the bottom right states: "The calculation is valid."

The bottom of the interface shows the 'Measure Names' section with the following fields: 'Data Source', 'Age group', 'Religion', 'Insurance', 'Insurance chart', 'Wordcloud', and 'avg icu durat'. The status bar at the bottom indicates: '1 of 2 marks', '1 row by 1 column', and 'SUM of CNT(Subject Id): 27'.

Creating filters

Now I am going to use the calculated field “Age” to filter out age groups less than 58 (i.e) considering only Boomers generation or older people for the purpose of this project as they are the age group of people with significant amount of diseases as they get older.

It is done by dragging “Age” to the “Filters” Tab on the left and selecting only “Boomers” and “Post war”

The screenshot shows the Tableau Desktop interface with the following components:

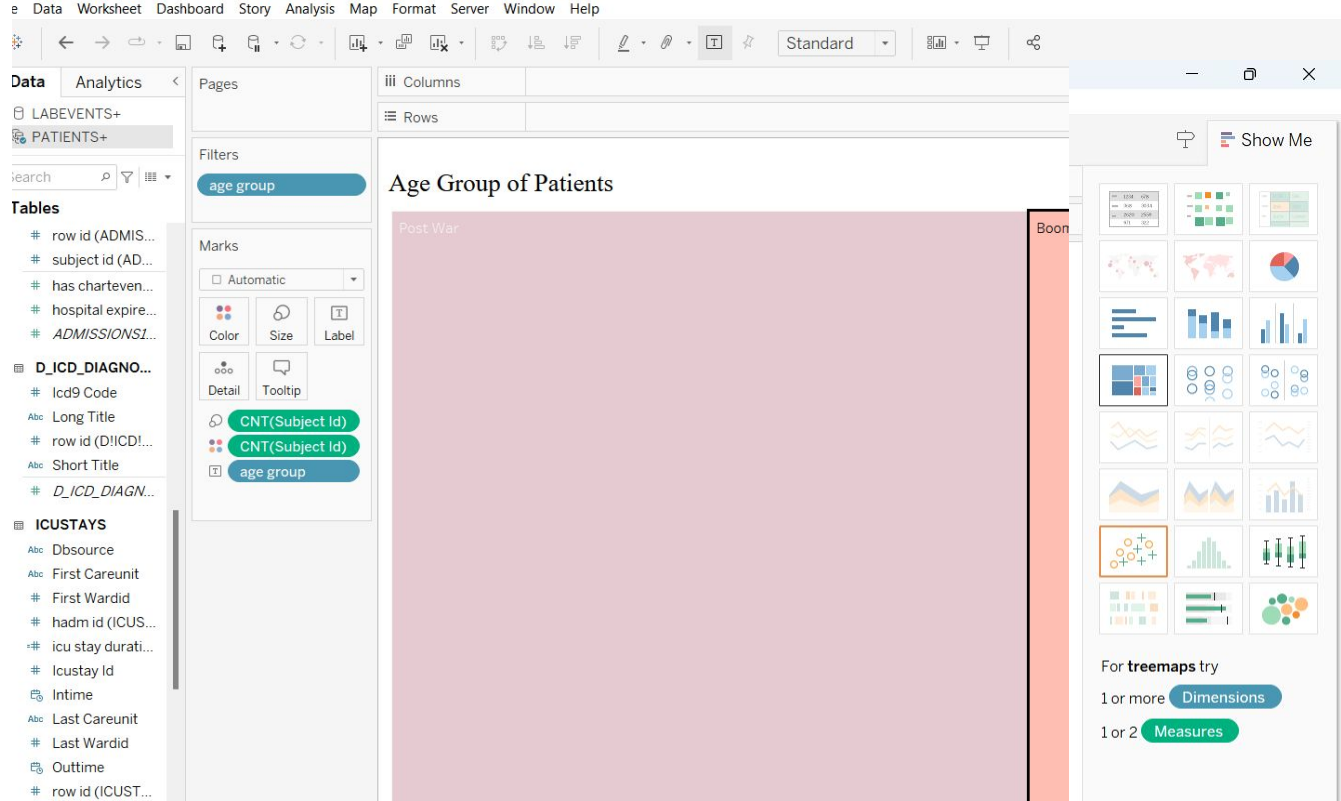
- Tableau - Mimic Tableau_Hari** (Title Bar)
- Menu Bar:** File, Data, Worksheet, Dashboard, Story, Analysis, Map, Format, Server, Window, Help
- Toolbar:** Standard, View, and other icons.
- Data Pane (Left):**
 - Tables: icu stay durati..., Icustay Id, Intime, Last Careunit, Last Wardid, Outtime, row id (ICU..., subject id (ICU..., Los, ICUSTAYS (Co...
 - PATIENTS** (Expanded):
 - age group (Selected)
 - Dob
 - Dod
 - Dod Hosp
 - Dod Ssn
 - Gender
 - Row Id
 - Subject Id
 - AGE
 - Expire Flag
 - PATIENTS (Co...
 - SERVICES
 - TRANSFERS
 - Measure Names
- Columns Shelf:** Religion
- Rows Shelf:** Religion
- Filters Shelf:** age group
- Marks Shelf:** Color, Size, Label, Detail, Tooltip (all set to CNT(PATIENTS))
- Region Table (Right):**

Religion	Count
CATHOLIC	30
NOT SPECIFIED	11
UNOBTAINABLE	10
PROTESTANT QUAK..	8
JEWISH	6
CHRISTIAN SCIENTI..	3
OTHER	2
ROMANIAN EAST. O..	1
BUDDHIST	1
- Filter [age group] Dialog Box (Right):**
 - General tab selected.
 - Selection: Selected 2 of 6 values
 - Selected items: Boomers, Post War
 - Summary: Field: [age group], Selection: Selected 2 of 6 values, Wildcard: All, Condition: None, Limit: None
- Bottom Bar:** 9 marks, 9 rows by 1 column, SUM of CNT(PATIENTS): 72
- Taskbar (Bottom):** Windows Start button, Search, and various application icons.

Age

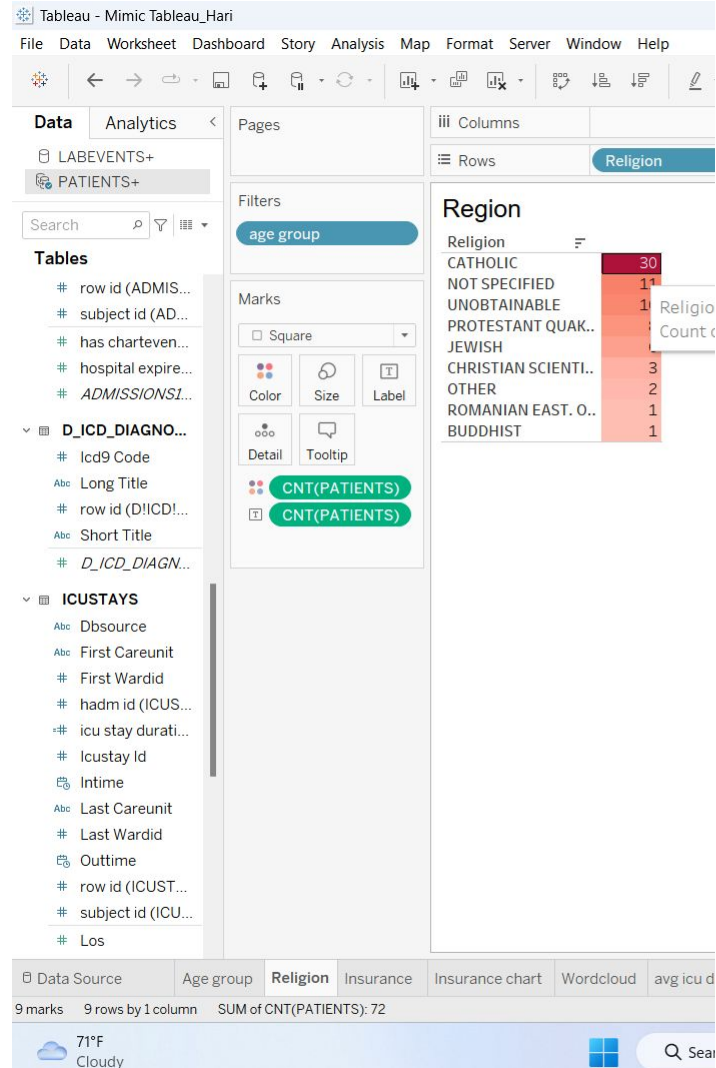
Now drag “Subject Id” from Patients to the Marks tab.

And then click on “Show Me” on the top right corner and select “tree maps”



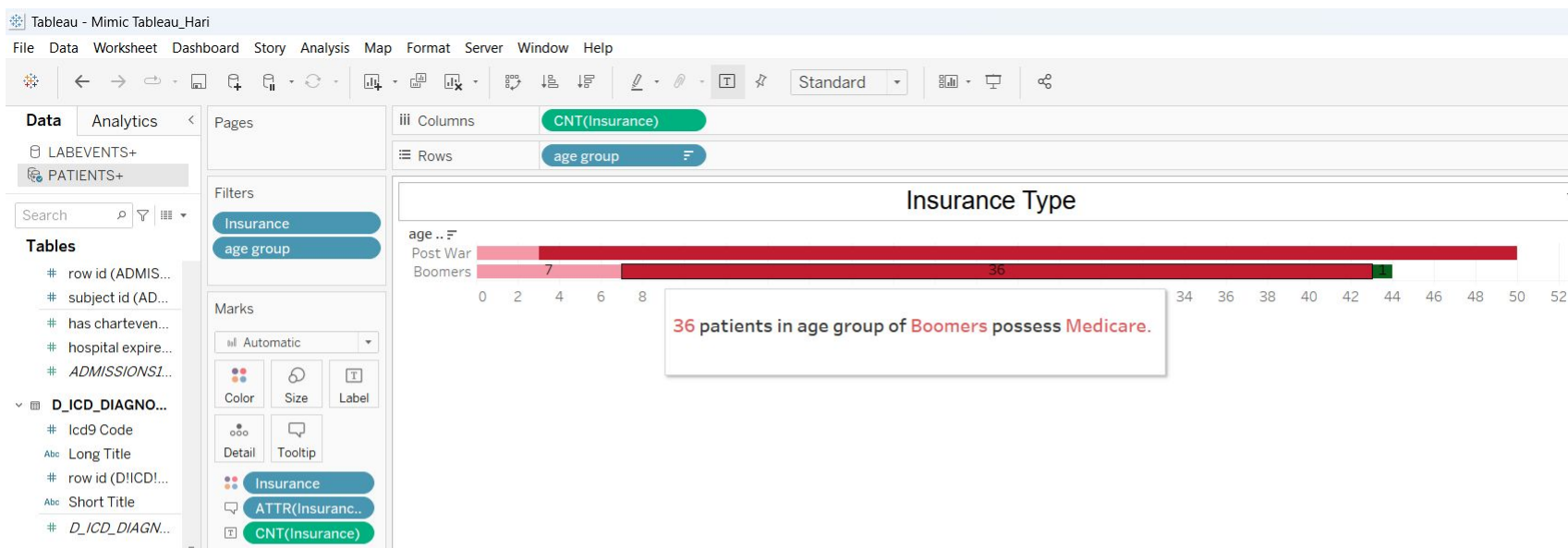
Finding Religion

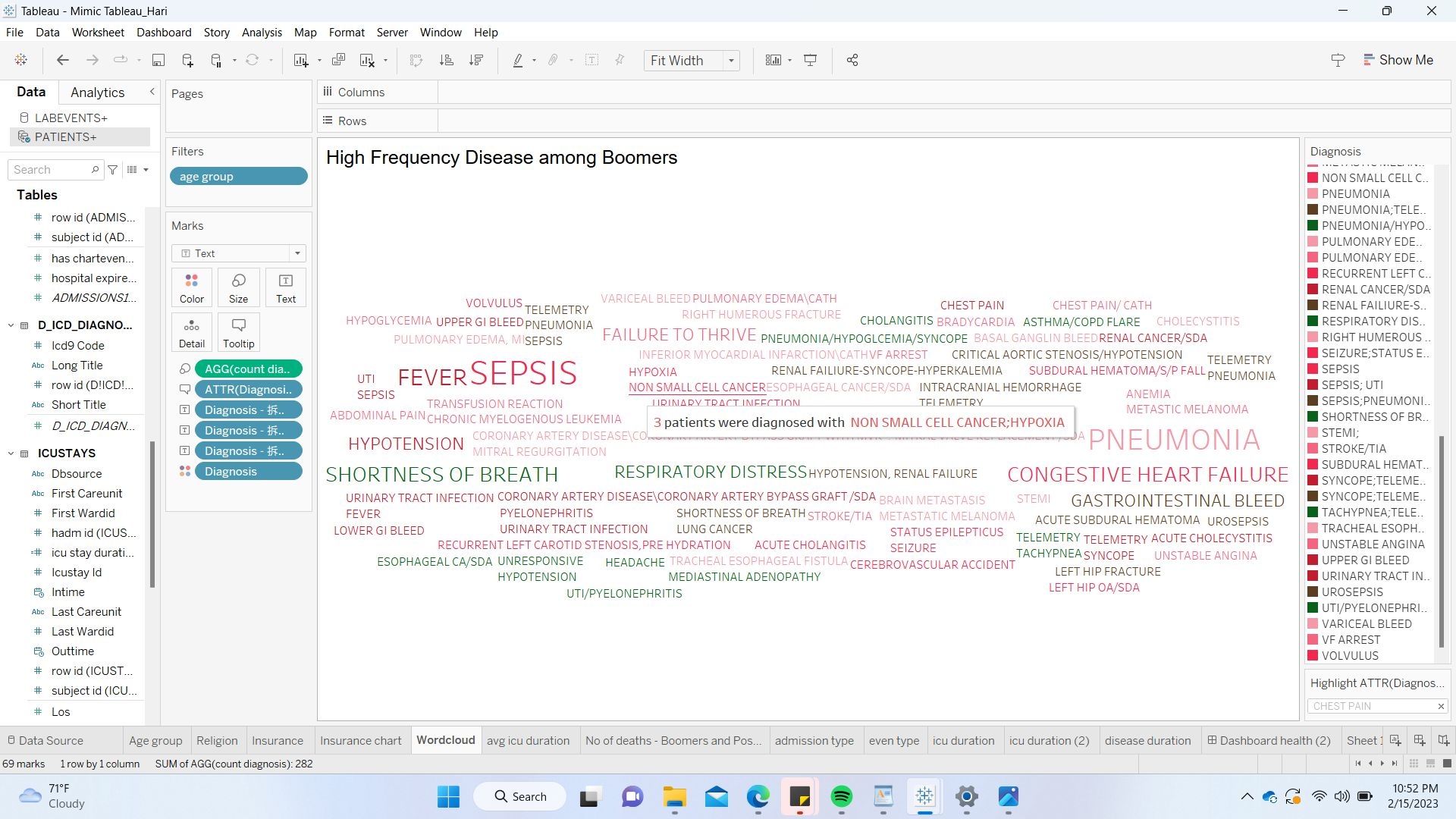
The next step is to create a table using the SHOW ME tab for finding no of patients according to religion.



Finding what type of Insurance do Boomers have in Majority

Drag Insurance into Columns Tab and age group into rows tab to have a look at the types of insurance held by Boomers and Post War born people. The color can be changed by clicking color under Marks. Tooltip can also be added by clicking on Tooltip and then using the field names for creating a tooltip with inferences as described below.





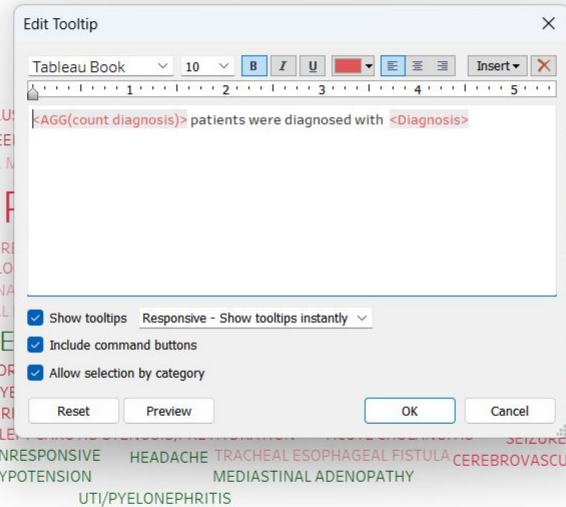
Creating Custom Tooltip

To insert results in tooltip, you can use the field within <> and include sentences along with the field. After creating a tooltip, You need to hover over the charts to see the results. This can save space.

Server Window Help

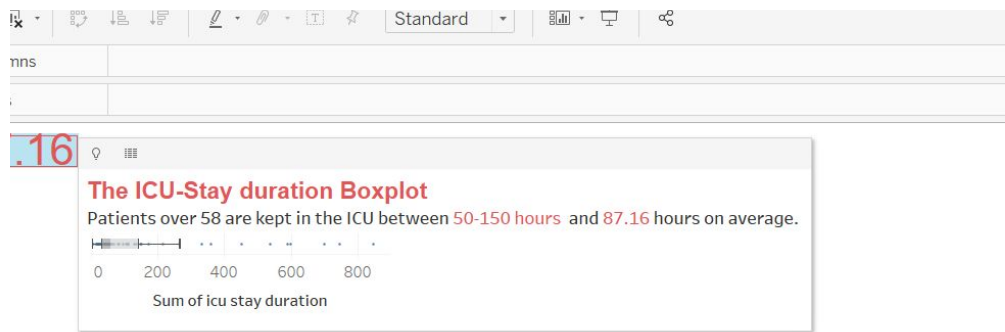
Fit Width

Frequency Disease among Boomers



Adding charts inside Tooltip

I found the average duration of stay in ICUs by Boomers and Post War using Box plots by using the range, min and max values to create the plot. The field used was Number of hours stayed. To save space and be more clear about the result derived, I displayed the boxplot inside the Toolkit. So only if we hover over the number, the boxplot will be shown. The method to create this is given in the next slide.



The sheet number of the results of Boxplot should be specified using the command below.

The screenshot displays the Tableau Desktop interface. On the left, the 'Data' pane shows a list of tables including 'PATIENTS+', 'D_ICD_DIAGNO...', and 'ICUSTAYS'. The 'Marks' card is set to 'Automatic', and the 'Columns' shelf contains the 'AVG(icu stay d...' field. A boxplot visualization is shown with a red data point labeled '87.16'. An 'Edit Tooltip' dialog box is open, showing the tooltip text: 'The ICU-Stay duration Boxplot' followed by 'Patients over 58 are kept in the ICU between 50-150 hours and 87.16 hours on average.' The dialog also includes a text field for the sheet name and dimensions, and checkboxes for 'Show tooltips', 'Include command buttons', and 'Allow selection by category'.

Tableau - Mimic Tableau_Hari

File Data Worksheet Dashboard Story Analysis Map Format Server Window Help

Standard

Data Analytics

Columns

Rows

Filters

age group

Search

Tables

- # row id (ADMIS...
- # subject id (AD...
- # has charteven...
- # hospital expire...
- # ADMISSIONS1...

D_ICD_DIAGNO...

- # Icd9 Code
- Abc Long Title
- # row id (D!ICD!...
- Abc Short Title
- # D_ICD_DIAGN...

ICUSTAYS

- Abc Dbsource
- Abc First Careunit
- # First Wardid
- # hadm id (ICUS...
- + # icu stay durati...
- # Icustay Id
- Intime
- Abc Last Careunit
- # Last Wardid

Marks

Automatic

Color Size Text

Detail Tooltip

AVG(icu stay d...

87.16

Edit Tooltip

Tableau Book 10 8 I U Insert X

1 2 3 4 5

The ICU-Stay duration Boxplot

Patients over 58 are kept in the ICU between 50-150 hours and 87.16 hours on average.

<Sheet name="18" maxwidth="300" maxheight="300" filter="<All Fields>">

☒ Show tooltips Responsive - Show tooltips instantly

☒ Include command buttons

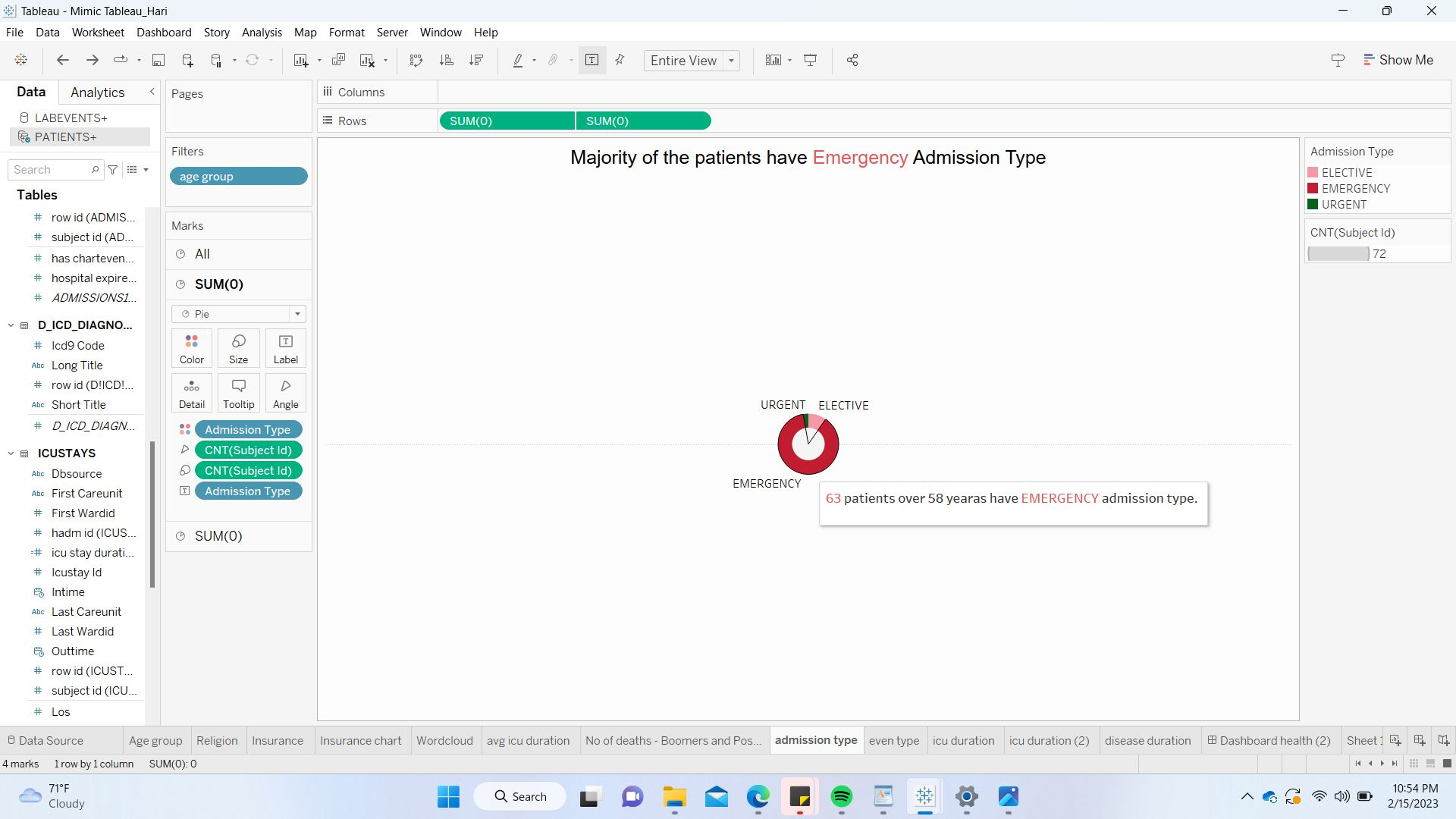
☒ Allow selection by category

Reset Preview OK Cancel

Creating pie charts

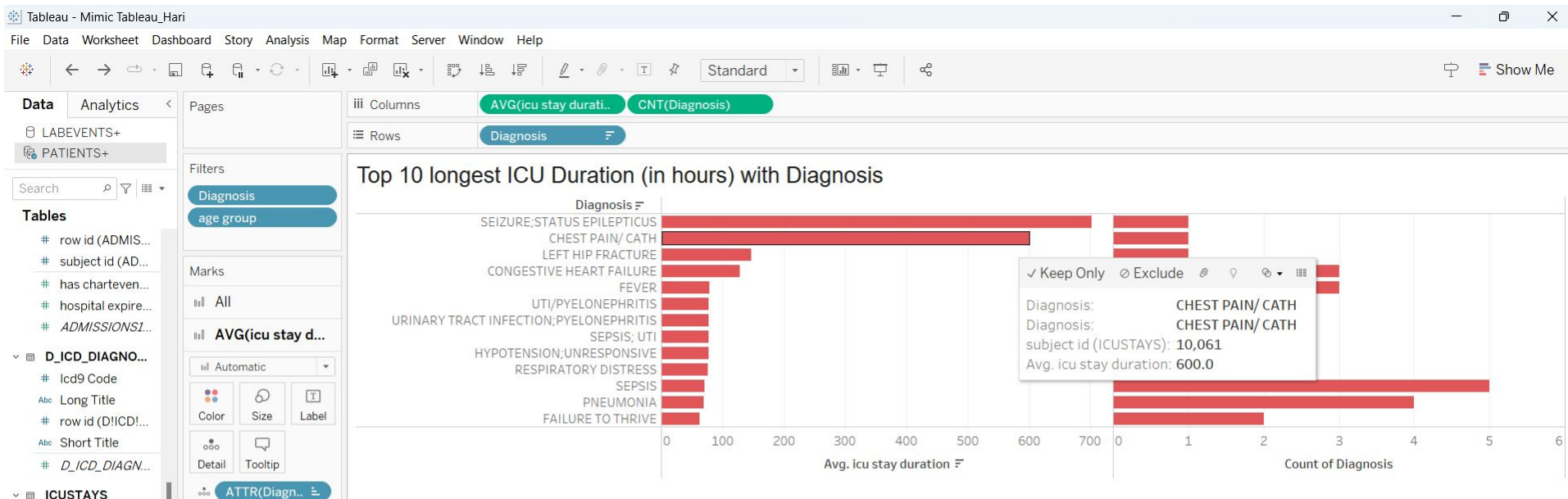
Pie charts are more straightforward and is created by dragging the category field (i.e) admission type into rows and find the sum of each type of field. Drag subject id - unique id for identifying patient into the Marks Tab and choose Pie chart from the charts.

The same method should be followed for event type, insurance type charts.



Creating Bar charts

Bar charts are used for finding the top 10 longest and shortest duration stays. AVG(duration stay) and CNT(duration stay) is dragged to columns. Diagnosis is dragged to rows. It is sorted in the descending order.

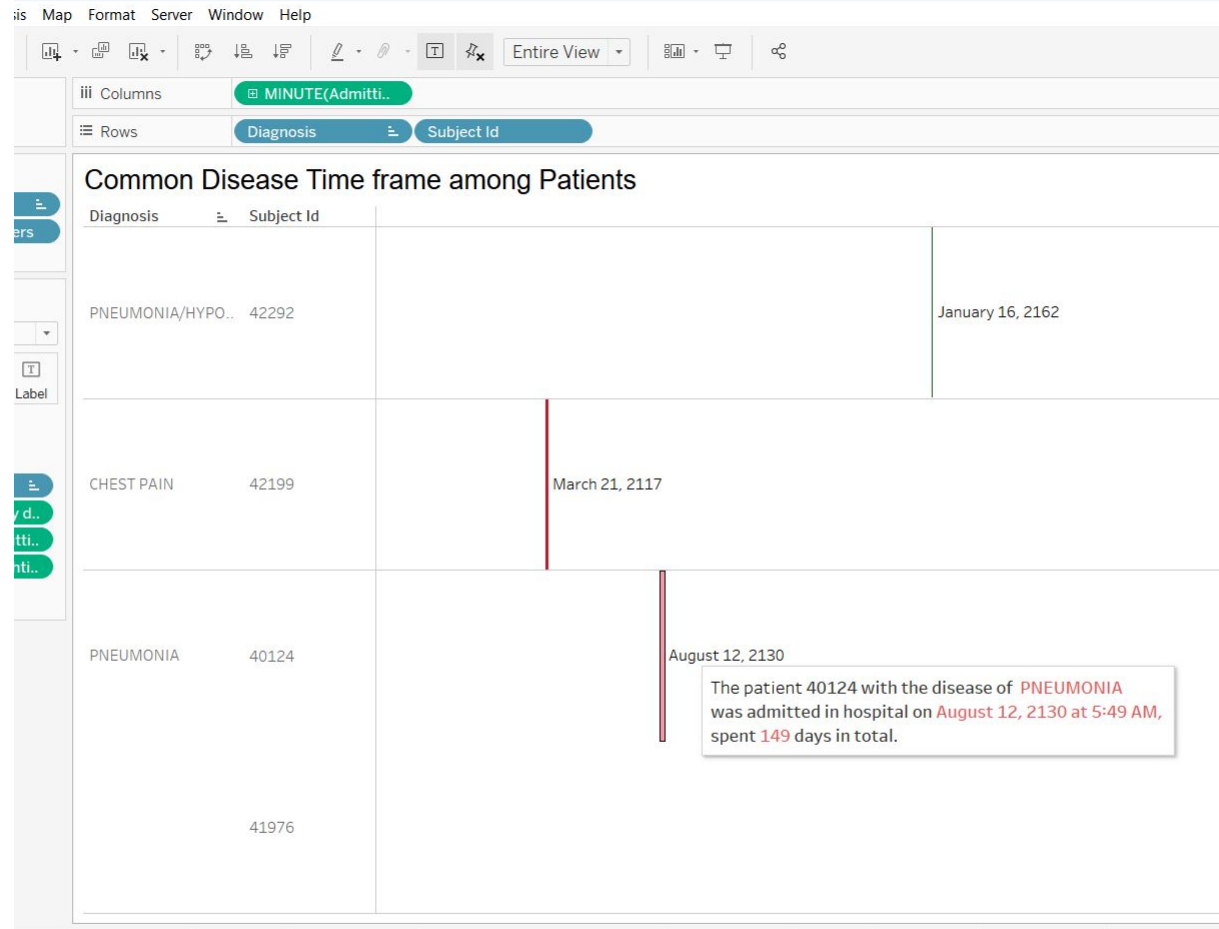


Finding time period of stay for prevalent diseases

Common disease among patients is found by using admitted time and discharged time difference and dragging into columns.

While drag Diagnosis and Subject id to rows.

The filter agegroup(Boomer, Post War) should be applied to all worksheets.



7 marks 4 rows by 1 column SUM(icu stay duration): 4.984

Final Dashboard

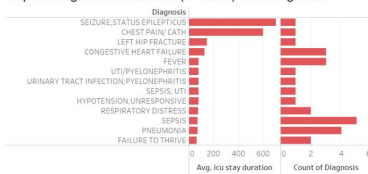
Analysis of Health of Elderly people. (58+)

26 deaths occurred in people over 58 years of age

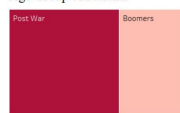
87.16 hours were spent on average in ICUs

The MIMIC III dataset is a valuable resource for analyzing the health of baby boomers, as it contains detailed clinical data from over 60,000 patients admitted to the intensive care units (ICUs) of a large academic medical center in the United States. This data includes demographic information, vital signs, laboratory results, diagnoses, and medications, among other variables.

Top 10 longest ICU Duration (in hours) with Diagnosis



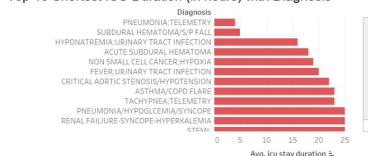
Age Group of Patients



Patients who were admitted, discharged or transferred were taken into account

SEIZURE STATUS EPILEPTICUS and CHEST PAIN are 2 diagnosis that keeps ahead to have the longest ICU duration, both of them possess records of over 600 hours

Top 10 Shortest ICU Duration (in hours) with Diagnosis

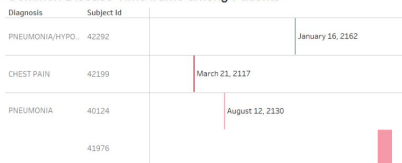


83 patients had Medicare Insurance



Patients diagnosed with PNEUMONIA have the shortest ICU-Duration, only stayed 4 hours.

Common Disease Time frame among Patients



Majority of the patients have Emergency Admission Type



High Frequency Disease among Boomers

Highlight Diagnosis
No items highlighted



Venous catheterization is the most commonly performed procedure for patients over 58.

