```
import pandas as pd
import numpy as np
import matplotlib.pyplot as plt
import tensorflow
from tensorflow.keras.models import Sequential
from tensorflow.keras.layers import Layer, Dense, Dropout
```

```
data = pd.read_csv('/content/weather.csv')
```

```
data.head()
```

	age	sex	on_thyroxine	query_on_thyroxine	on_antithyroid_meds	sick	pregnant	thyr
0	29	F	f	f	f	f	f	
1	29	F	f	f	f	f	f	
2	41	F	f	f	f	f	f	
3	36	F	f	f	f	f	f	
4	32	F	f	f	f	f	f	

5 rows × 31 columns

```
data.isnull().sum()
```

```
age                       0
sex                     307
on_thyroxine              0
query_on_thyroxine        0
on_antithyroid_meds       0
sick                      0
pregnant                  0
thyroid_surgery           0
I131_treatment            0
query_hypothyroid         0
query_hyperthyroid        0
lithium                   0
goitre                    0
tumor                     0
hypopituitary             0
psych                     0
TSH_measured              0
TSH                     842
T3_measured               0
T3                     2604
TT4_measured              0
TT4                     442
T4U_measured              0
T4U                     809
FTI_measured              0
FTI                     802
TBG_measured              0
TBG                    8823
referral_source           0
target                    0
patient_id                0
dtype: int64
```

```
data.dropna(subset=['target'],inplace=True)
```

```
data['target'].value_counts()
```

```
-      6771
K       436
G       359
I       346
F       233
R       196
A       147
L       115
M       111
N       110
```

```
S        85
GK       49
AK       46
J        30
B        21
MK       16
Q        14
O        14
C|I      12
KJ       11
GI       10
H|K       8
D         8
FK        6
C         6
P         5
MI        2
LJ        1
GKJ       1
OI        1
D|R       1
E         1
Name: target, dtype: int64
```

```
#Checking whether the age above 100
data[data.age>100]
```

	age	sex	on_thyroxine	query_on_thyroxine	on_antithyroid_meds	sick	pregnant
2976	455	F	f	f	f	f	f
5710	65511	M	f	f	f	f	f
6392	65512	M	f	f	f	f	f
8105	65526	F	f	f	f	f	f

4 rows × 31 columns

```
x=data.iloc[:,0:-1]
y=data.iloc[:,-1]
```

```
x
```

	age	sex	on_thyroxine	query_on_thyroxine	on_antithyroid_meds	sick	pregnant	t
0	29	F	f	f	f	f	f	
1	29	F	f	f	f	f	f	
2	41	F	f	f	f	f	f	
3	36	F	f	f	f	f	f	
4	32	F	f	f	f	f	f	
...	...	...	...	...	...	...	...	
9167	56	M	f	f	f	f	f	
9168	22	M	f	f	f	f	f	
9169	69	M	f	f	f	f	f	
9170	47	F	f	f	f	f	f	
9171	31	M	f	f	f	f	f	

9172 rows × 28 columns

```
x['sex'].unique()
```

```
array(['F', 'M', nan], dtype=object)
```

```
x['sex'].replace(np.nan, 'F', inplace=True)
```

```
x['sex'].value_counts()
```

```
F    6380
M    2792
Name: sex, dtype: int64
```

```
x.info()
```

```
<class 'pandas.core.frame.DataFrame'>
RangeIndex: 9172 entries, 0 to 9171
Data columns (total 28 columns):
 #   Column               Non-Null Count  Dtype  
---  ------               --------------  -----  
 0   age                  9172 non-null   int64  
 1   sex                  9172 non-null   object 
 2   on_thyroxine         9172 non-null   object 
 3   query_on_thyroxine   9172 non-null   object 
 4   on_antithyroid_meds  9172 non-null   object 
 5   sick                 9172 non-null   object 
 6   pregnant             9172 non-null   object 
 7   thyroid_surgery      9172 non-null   object 
 8   I131_treatment       9172 non-null   object 
 9   query_hypothyroid    9172 non-null   object 
 10  query_hyperthyroid   9172 non-null   object 
 11  lithium              9172 non-null   object 
 12  goitre               9172 non-null   object 
 13  tumor                9172 non-null   object 
 14  hypopituitary        9172 non-null   object 
 15  psych                9172 non-null   object 
 16  TSH                  8330 non-null   float64
 17  T3                   6568 non-null   float64
 18  TT4_measured         9172 non-null   object 
 19  TT4                  8730 non-null   float64
 20  T4U_measured         9172 non-null   object 
 21  T4U                  8363 non-null   float64
 22  FTI_measured         9172 non-null   object 
 23  FTI                  8370 non-null   float64
 24  TBG_measured         9172 non-null   object 
 25  TBG                  349 non-null    float64
 26  referral_source      9172 non-null   object 
 27  target               9172 non-null   object 
dtypes: float64(6), int64(1), object(21)
memory usage: 2.0+ MB
```

```
from sklearn.preprocessing import OrdinalEncoder, LabelEncoder
ordinal_encoder=OrdinalEncoder(dtype='int64')
x.iloc[:, 1:16] = ordinal_encoder.fit_transform(x.iloc[:, 1:16])
#ordinal_encoder.fit_transform(x[['sex']])
```

```
x
```

	age	sex	on_thyroxine	query_on_thyroxine	on_antithyroid_meds	sick	pregnant	t
0	29	0	0	0	0	0	0	
1	29	0	0	0	0	0	0	
2	41	0	0	0	0	0	0	
3	36	0	0	0	0	0	0	
4	32	0	0	0	0	0	0	
...	...	...	...	...	...	...	...	
9167	56	1	0	0	0	0	0	
9168	22	1	0	0	0	0	0	
9169	69	1	0	0	0	0	0	
9170	47	0	0	0	0	0	0	
9171	31	1	0	0	0	0	0	

9172 rows × 28 columns

```
x.replace(np.nan, '0', inplace=True)
x
```

	age	sex	on_thyroxine	query_on_thyroxine	on_antithyroid_meds	sick	pregnant	t
0	29	0	0	0	0	0	0	
1	29	0	0	0	0	0	0	
2	41	0	0	0	0	0	0	
3	36	0	0	0	0	0	0	
4	32	0	0	0	0	0	0	
...	...	...	...	...	...	...	...	
9167	56	1	0	0	0	0	0	
9168	22	1	0	0	0	0	0	
9169	69	1	0	0	0	0	0	
9170	47	0	0	0	0	0	0	
9171	31	1	0	0	0	0	0	

9172 rows × 28 columns

```
label_encoder = LabelEncoder()
y_dt=label_encoder.fit_transform(y)


y=pd.DataFrame(y_dt, columns=['targest'])
y
```

	targest
0	0
1	1
2	2
3	3
4	4
...	...
9167	9167
9168	9168
9169	9169
9170	9170
9171	9171

9172 rows × 1 columns

```
from  sklearn.model_selection import train_test_split
x_train,x_test,y_train,y_test=train_test_split(x,y,test_size=0.20,random_state=0)


from imblearn.over_sampling import SMOTE
y_train.value_counts()
```

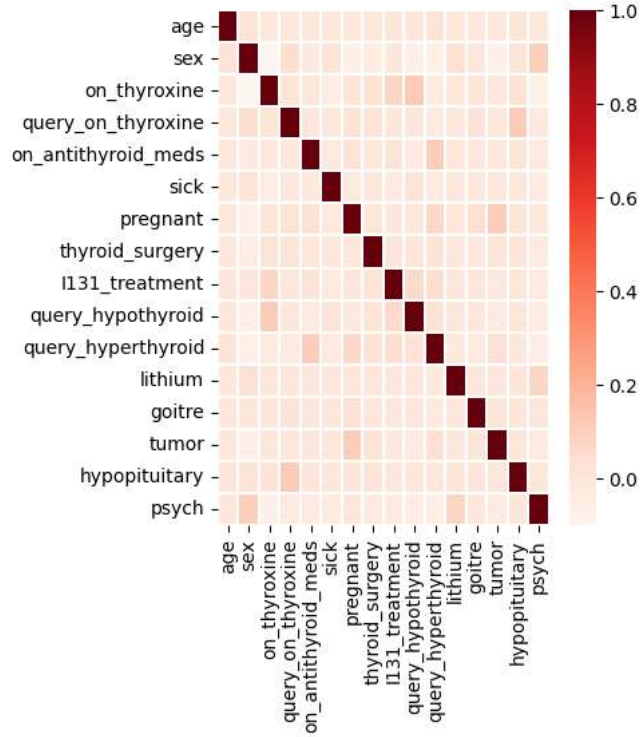
```
targest
0          1
6141       1
6138       1
6137       1
6135       1
          ..
3066       1
3064       1
3062       1
3061       1
9170       1
Length: 7337, dtype: int64
```

```
import seaborn as sns
```

+ Code + Text

```
#checking correlation using heatmap
f, ax = plt.subplots(figsize = (4,5))
sns.heatmap(corrmat, ax = ax, cmap="Reds", linewidths = 0.1)
```

```
<Axes: >
```



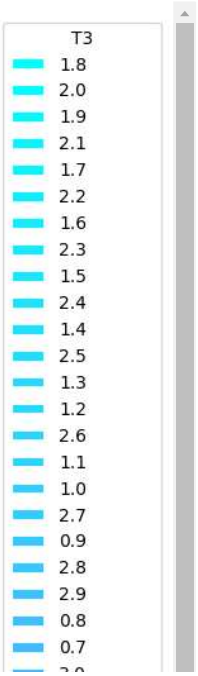

```
import os


from scipy import stats


from imblearn.ensemble import BalancedBaggingClassifier


os=SMOTE(random_state=0,k_neighbors=1)
x_bal,y_bal=os.fit_resample(x_train,y_train)
x_test_bal,y_test_bal=os.fit_resample(x_test,y_test)
```

```
---------------------------------------------------------------------------
ValueError                                Traceback (most recent call last)
<ipython-input-39-5837100947c9> in <cell line: 2>()
      1 os=SMOTE(random_state=0,k_neighbors=1)
----> 2 x_bal,y_bal=os.fit_resample(x_train,y_train)
      3 x_test_bal,y_test_bal=os.fit_resample(x_test,y_test)

 ———————————————————————————— 7 frames ————————————————————————————
/usr/local/lib/python3.9/dist-packages/pandas/core/generic.py in __array__(self, dtype)
   2068
   2069     def __array__(self, dtype: npt.DTypeLike | None = None) -> np.ndarray:
-> 2070         return np.asarray(self._values, dtype=dtype)
   2071
   2072     def __array_wrap__(

ValueError: could not convert string to float: 't'
```

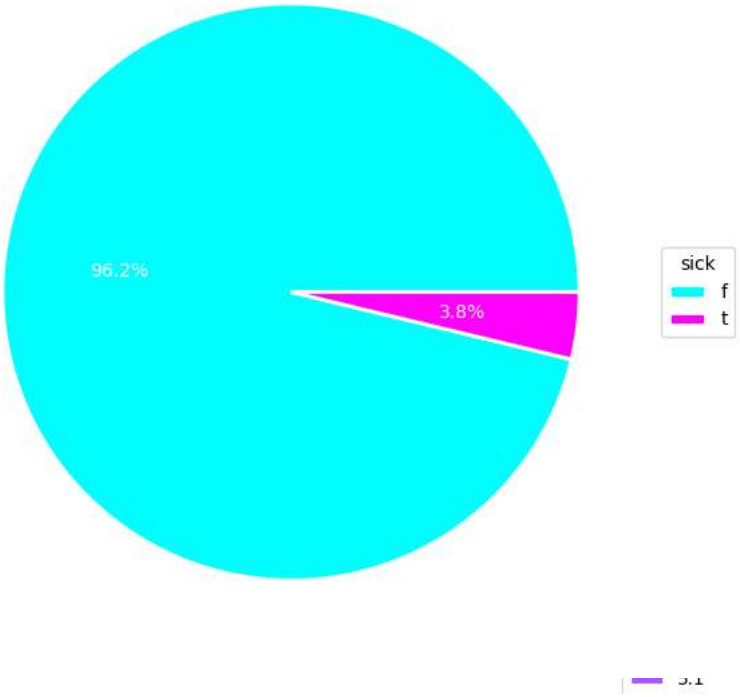
SEARCH STACK OVERFLOW

```
import pandas as pd
import numpy as np
import seaborn as sns
import matplotlib.pyplot as plt
import matplotlib.cm as cm
from sklearn.model_selection import train_test_split, GridSearchCV
from sklearn.tree import DecisionTreeClassifier
from sklearn.metrics import accuracy_score, classification_report, confusion_matrix


def pie_graph(col):
  vc = data[col].value_counts()
  colors = cm.cool(np.linspace(0, 1, len(vc)))
```

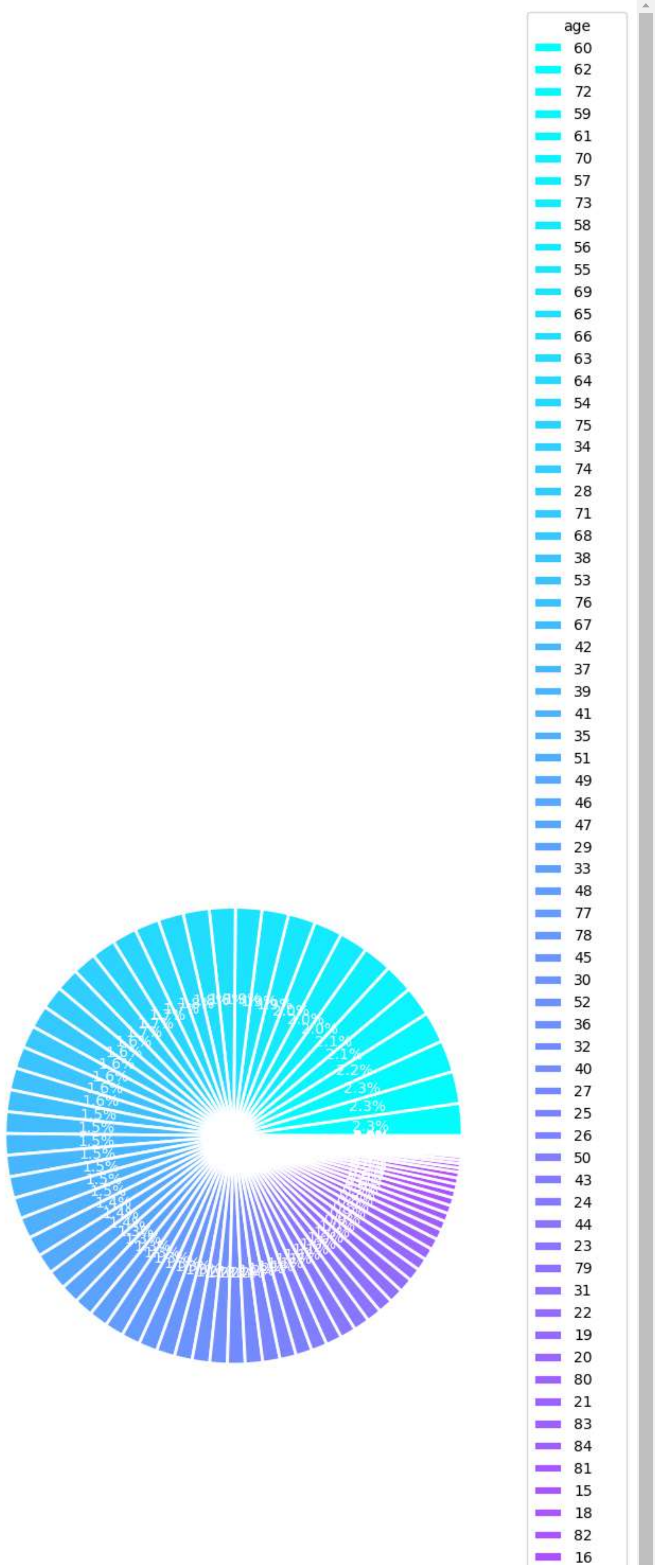
```
    fig, ax = plt.subplots(figsize = (8,7), subplot_kw = dict(aspect="equal"))
    wedges, texts, autotexts = ax.pie(vc, autopct = '%1.1f%%', textprops=dict(color="w", fontsize = 10),wedgeprops = {'linewidth': 2, 'edgecolo
    ax.legend(wedges, vc.index, title = col, loc = "center left", bbox_to_anchor = (1, 0, 0.5, 1))


pie_graph('T3')
```




```
pie_graph('sick')
```




```
pie_graph('age')
```


age
60
62
72
59
61
70
57
73
58
56
55
69
65
66
63
64
54
75
34
74
28
71
68
38
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27
25
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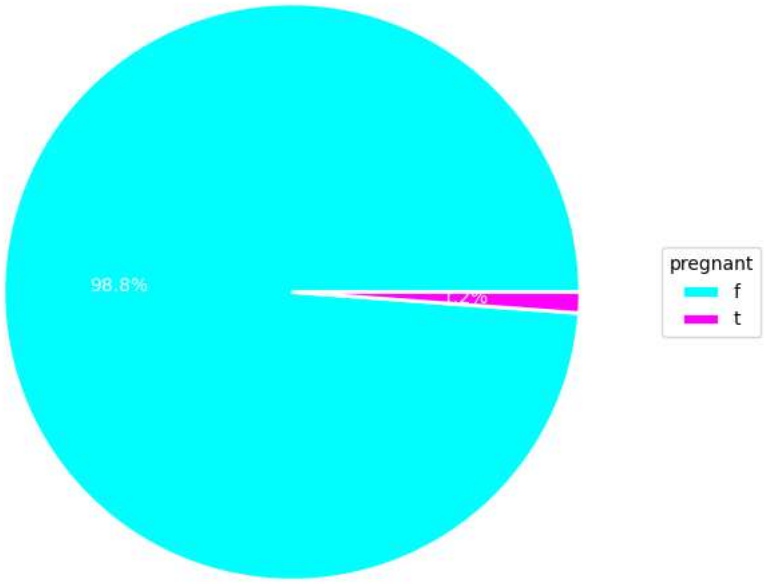
50
43
24
44
23
79
31
22
19
20
80
21
83
84
81
15
18
82
16

```
pie_graph('pregnant')
```




```
pd.set_option('display.max_columns', None)
pd.set_option('display.max_rows', None)


print(data.head())
```

```
   age sex on_thyroxine query_on_thyroxine on_antithyroid_meds sick pregnant  \
0   29   F            f                  f                   f    f        f
1   29   F            f                  f                   f    f        f
2   41   F            f                  f                   f    f        f
3   36   F            f                  f                   f    f        f
4   32   F            f                  f                   f    f        f

  thyroid_surgery I131_treatment query_hypothyroid query_hyperthyroid lithium  \
0               f              f                 t                   f       f
1               f              f                 f                   f       f
2               f              f                 f                   t       f
3               f              f                 f                   f       f
4               f              f                 f                   f       f

  goitre tumor hypopituitary psych TSH_measured  TSH T3_measured   T3  \
0      f     f             f     f            t  0.3           f  NaN
1      f     f             f     f            t  1.6           t  1.9
2      f     f             f     f            f  NaN           f  NaN
3      f     f             f     f            f  NaN           f  NaN
4      f     f             f     f            f  NaN           f  NaN

  TT4_measured    TT4 T4U_measured  T4U FTI_measured  FTI TBG_measured   TBG  \
0            f    NaN            f  NaN            f  NaN            f   NaN
1            t  128.0            f  NaN            f  NaN            f   NaN
2            f    NaN            f  NaN            f  NaN            t  11.0
3            f    NaN            f  NaN            f  NaN            t  26.0
4            f    NaN            f  NaN            f  NaN            t  36.0

  referral_source target  patient_id
0           other      -   840801013
1           other      -   840801014
2           other      -   840801042
3           other      -   840803046
4           other      S   840803047
```

```
plt.hist(data['sick'])
```

```
(array([8828.,    0.,    0.,    0.,    0.,    0.,    0.,    0.,    0.,
         344.]),
 array([0. , 0.1, 0.2, 0.3, 0.4, 0.5, 0.6, 0.7, 0.8, 0.9, 1. ]),
 <BarContainer object of 10 artists>)
```


```
#Splitting the data values as x and y
x=data.iloc[:,0:1]
y=data.iloc[:,-1]
```

x

	Age
0	23
1	47
2	47
3	28
4	61
...	...
195	56
196	16
197	52
198	23
199	40

200 rows × 1 columns

```
x['Sex'].unique()
```

```
---------------------------------------------------------------------------
KeyError                                  Traceback (most recent call last)
/usr/local/lib/python3.9/dist-packages/pandas/core/indexes/base.py in get_loc(self,
key, method, tolerance)
   3628             try:
-> 3629                 return self._engine.get_loc(casted_key)
   3630             except KeyError as err:
```

```
x['Age']=x['Age'].astype('float')
x['BP']=x['BP'].astype('float')
```

```
pandas/_libs/hashtable_class_helper.pxi in
pandas._libs.hashtable.PyObjectHashTable.get_item()

KeyError: 'Sex'

The above exception was the direct cause of the following exception:

KeyError                                  Traceback (most recent call last)
/usr/local/lib/python3.9/dist-packages/pandas/core/indexes/base.py in get_loc(self,
key, method, tolerance)
   3629                 return self._engine.get_loc(casted_key)
   3630             except KeyError as err:
-> 3631                 raise KeyError(key) from err
   3632             except TypeError:
   3633                 # If we have a listlike key, _check_indexing_error will raise
```

✓ 2s completed at 9:15 AM