preprocess

March 18, 2020

1 0. Introdução

Trabalho Pré-Processamento:

Aluno: Gabriel Luiz

Disciplina: Tópico em Aprendizado de Máquina

Objetivos :

- Selecionar uma base de dados com dados faltantes
- Executar etapas do pré-processamento:
- – Limpeza
- – Transformação
- – Discretização
- Aplicar algum tipo de visualização dos dados

1.1 0.1 Dependências

Para realização da tarefa foram utilizados as seguintes bibliotecas:

[2]:
```
from datetime import datetime
import pandas as pd
import seaborn as sns
from sklearn import preprocessing
import matplotlib.pyplot as plt
from sex import SEX
```

2 1. Dados

Para realização das tarefas envolvidas no pré-processamento utilizou-se o arquivo **COVID19_open_line_list.csv** contém dados de pesoas que foram infectadas com o virus e sua localização

O objetivo da pesquisa foi estudar qual a relação das pessoas que possuem corona virus com suas informações pessoais. As informações coletadas incluíam **idade**, **sexo (masculino = 0, feminino = 1)**, **data inicio sintomas**, **data entrada no hospital** e **data de confirmação da doença**.

2.1 1.1 Informações sobre os dados:

Atributos:

- Idade: Idade (0 - Jovens até 15 anos, 1 - Adultos entre 15 e 64 anos , 2 - Idosos acima de adultos)
- Sexo: Sexo (0 - masculino / 1 - feminino)
- Inicio Sintomas: Data de inicio do sintomas
- Entrada Hospital: Data de entrada do hospital
- Confirmacao: Data de confirmação do virus

Classe:

- Trips: Viagens

2.2 1.2 Carregamento do arquivo

[3]:
```
arq_corona = './dataset/COVID19_open_line_list.csv'
```

[4]:
```
# Carregando os dados apenas com as colunas desejadas
corona = pd.read_csv(
    arq_corona,
    usecols=['ID', 'age', 'sex', 'date_onset_symptoms',␣
 ↪'date_admission_hospital', 'date_confirmation'],
    )
corona.columns = ['id', 'idade', 'sexo', 'inicio_sintomas','entrada_hospital',␣
 ↪'data_confirmacao']
```

[5]:
```
corona.head()
```

[5]:

	id	idade	sexo	inicio_sintomas	entrada_hospital	data_confirmacao
0	1.0	30	male	18.01.2020	20.01.2020	22.01.2020
1	2.0	47	male	10.01.2020	21.01.2020	23.01.2020
2	3.0	49	male	15.01.2020	20.01.2020	23.01.2020
3	4.0	47	female	17.01.2020	20.01.2020	23.01.2020
4	5.0	50	female	10.01.2020	21.01.2020	23.01.2020

[6]:
```
corona.describe()
```

[6]:

	id
count	13173.000000
mean	6769.250436

```
std     3920.886020
min        1.000000
25%     3351.000000
50%     6865.000000
75%    10180.000000
max    13479.000000
```

3 2. Aplicação de algoritmos

Problemas idenficados:

- 1. Dados faltantes representados por "NaN" ou em branco
- 2. Dados fora de uma normalização

[7]:
```
# # Exibindo os dados de cada coluna separadamente
# ser_aggCol=corona.aggregate(lambda x: [x.tolist()], axis=0).map(lambda x:x[0])
# print('ser_aggCol (collapse each column to a list)',ser_aggCol, sep='\n',␣
 ↪end='\n\n\n')
```

3.1 2.1 Removendo registros vazios

[8]:
```
corona = corona.drop(corona[pd.isna(corona.id)].index)
```

3.2 2.2 Processando a coluna referente ao sexo

[9]:
```
corona.sexo.unique()
```

[9]:
```
array(['male', 'female', nan, 'Female', 'Male'], dtype=object)
```

[10]:
```
# Removendo sexos diferentes dos esperados
corona.sexo = SEX.process_data(corona)
corona.sexo.unique()
```

[10]:
```
array(['0', '1'], dtype=object)
```

3.3 2.3 Processando a idade

[11]:
```
# Removendo idades invalidas e add a media nos valores nulos

validAgeValues = []
for age in corona.idade:
    if pd.isna(age):
```

```
        validAgeValues.append(age)
    if not pd.isna(age) and not "-" in str(age) and not "." in str(age)  and 0␣
↪< int(age) < 99:
        validAgeValues.append(age)

corona = corona[corona['idade'].isin(validAgeValues)]
corona.idade = corona.idade.fillna(corona.idade.mode()[0])
corona.idade.unique()
```

[11]:
```
array(['30', '47', '49', '50', '33', '42', '59', '39', '38', '45', '37',
       '32', '18', '56', '44', '65', '21', '41', '70', '43', '31', '24',
       '40', '66', '36', '10', '63', '78', '76', '48', '62', '46', '34',
       '72', '20', '54', '2', '29', '61', '51', '80', '69', '28', '55',
       '68', '57', '35', '27', '52', '22', '23', '88', '19', '60', '58',
       '53', '25', '26', '64', '11', '73', '74', '7', '82', '67', '15',
       '16', '5', '3', '4', '71', '77', '75', '94', '81', '17', '8', '9',
       '12', '83', '84', '1', '79', '87', '96'], dtype=object)
```

[12]:
```
for i, row in corona.iterrows():
  if int(row.idade) < 15:
    #   jovens
    ifor_val = "0"
  if 15 <= int(row.idade) <= 64:
    #   adultos
    ifor_val = "1"
  if 64 < int(row.idade) < 100:
    #   idosos
    ifor_val = "2"
  corona.at[i,'idade'] = ifor_val
```

[13]:
```
corona.idade.unique()
```

[13]:
```
array(['1', '2', '0'], dtype=object)
```

3.4 2.3 Processando as datas

3.5 2.3.1 Processando a data de inicio dos sintomas

[14]:
```
validDates = []
for i, row in corona.iterrows():
    if pd.isna(row.inicio_sintomas):
        validDates.append(row.inicio_sintomas)
    if len(str(row.inicio_sintomas)) == 10:
        parsedDate = row.inicio_sintomas.split('.')
        if int(parsedDate[1]) > 12:
```

```
            formatedDate = parsedDate[2] + '-' + parsedDate[0] + '-' +␣
 ↪parsedDate[1]
        else:
            formatedDate = parsedDate[2] + '-' + parsedDate[1] + '-' +␣
 ↪parsedDate[0]
        date = datetime.strptime(formatedDate, "%Y-%m-%d")
        corona.at[i,'inicio_sintomas'] = date.timestamp()
        validDates.append(date.timestamp())

corona = corona[corona['inicio_sintomas'].isin(validDates)]
corona.inicio_sintomas = corona.inicio_sintomas.fillna(corona.inicio_sintomas.
 ↪mean())
corona.inicio_sintomas.unique()
```

[14]:
```
array([1.57931640e+09, 1.57862520e+09, 1.57905720e+09, 1.57923000e+09,
       1.57999603e+09, 1.57957560e+09, 1.57940280e+09, 1.57966200e+09,
       1.57845240e+09, 1.57897080e+09, 1.57853880e+09, 1.57914360e+09,
       1.57948920e+09, 1.57810680e+09, 1.57802040e+09, 1.57784760e+09,
       1.57793400e+09, 1.57888440e+09, 1.57974840e+09, 1.57758840e+09,
       1.57871160e+09, 1.57879800e+09, 1.57983480e+09, 1.57819320e+09,
       1.57992120e+09, 1.58000760e+09, 1.58009400e+09, 1.58018040e+09,
       1.58035320e+09, 1.58026680e+09, 1.58052600e+09, 1.58043960e+09,
       1.58061240e+09, 1.58078520e+09, 1.58069880e+09, 1.58104440e+09,
       1.58087160e+09, 1.58095800e+09, 1.58130360e+09, 1.58113080e+09,
       1.58164920e+09, 1.58139000e+09, 1.58147640e+09, 1.58121720e+09,
       1.58182200e+09, 1.58216760e+09, 1.58156280e+09, 1.58199480e+09,
       1.58190840e+09, 1.58251320e+09, 1.58259960e+09, 1.58242680e+09])
```

3.6 2.3.1 Processando a data de entrada no hospital

[15]:
```
validDates = []
for i, row in corona.iterrows():
    if pd.isna(row.entrada_hospital):
        validDates.append(row.entrada_hospital)
    if len(str(row.entrada_hospital)) == 10:
        parsedDate = row.entrada_hospital.split('.')
        if int(parsedDate[1]) > 12:
            formatedDate = parsedDate[2] + '-' + parsedDate[0] + '-' +␣
 ↪parsedDate[1]
        else:
            formatedDate = parsedDate[2] + '-' + parsedDate[1] + '-' +␣
 ↪parsedDate[0]
        date = datetime.strptime(formatedDate, "%Y-%m-%d")
        corona.at[i,'entrada_hospital'] = date.timestamp()
        validDates.append(date.timestamp())
```

```
corona = corona[corona['entrada_hospital'].isin(validDates)]
corona.entrada_hospital = corona.entrada_hospital.fillna(corona.
 ↪entrada_hospital.mean())
corona.entrada_hospital.unique()
```

[15]:
```
array([1.57948920e+09, 1.57957560e+09, 1.58029423e+09, 1.57983480e+09,
       1.57966200e+09, 1.57845240e+09, 1.57897080e+09, 1.57940280e+09,
       1.57905720e+09, 1.57862520e+09, 1.57871160e+09, 1.57923000e+09,
       1.57974840e+09, 1.57931640e+09, 1.57879800e+09, 1.57888440e+09,
       1.57914360e+09, 1.57810680e+09, 1.58018040e+09, 1.57992120e+09,
       1.58000760e+09, 1.58009400e+09, 1.58026680e+09, 1.58035320e+09,
       1.58043960e+09, 1.58052600e+09, 1.58061240e+09, 1.58069880e+09,
       1.58078520e+09, 1.58087160e+09, 1.58095800e+09, 1.58104440e+09,
       1.58113080e+09, 1.58139000e+09, 1.58147640e+09, 1.58164920e+09,
       1.58130360e+09, 1.58173560e+09, 1.58190840e+09, 1.58156280e+09,
       1.58121720e+09, 1.58182200e+09, 1.58208120e+09, 1.58225400e+09,
       1.58234040e+09, 1.58199480e+09, 1.58242680e+09, 1.58251320e+09,
       1.58259960e+09, 1.58268600e+09, 1.58277240e+09, 1.58216760e+09])
```

3.7 2.3.1 Processando a data de confirmação do virus

[16]:
```
validDates = []
for i, row in corona.iterrows():
    if pd.isna(row.data_confirmacao):
        validDates.append(row.data_confirmacao)
    if len(str(row.data_confirmacao)) == 10:
        parsedDate = row.data_confirmacao.split('.')
        if int(parsedDate[1]) > 12:
            formatedDate = parsedDate[2] + '-' + parsedDate[0] + '-' +␣
 ↪parsedDate[1]
        else:
            formatedDate = parsedDate[2] + '-' + parsedDate[1] + '-' +␣
 ↪parsedDate[0]
        date = datetime.strptime(formatedDate, "%Y-%m-%d")
        corona.at[i,'data_confirmacao'] = date.timestamp()
        validDates.append(date.timestamp())

corona = corona[corona['data_confirmacao'].isin(validDates)]
corona.data_confirmacao = corona.data_confirmacao.fillna(corona.
 ↪data_confirmacao.mean())
corona.data_confirmacao.unique()
```

[16]:
```
array([1.57966200e+09, 1.57974840e+09, 1.57983480e+09, 1.57992120e+09,
       1.58000760e+09, 1.58009400e+09, 1.57957560e+09, 1.58093446e+09,
```

```
       1.57940280e+09, 1.57948920e+09, 1.57905720e+09, 1.57879800e+09,
       1.57923000e+09, 1.58018040e+09, 1.58026680e+09, 1.58035320e+09,
       1.58043960e+09, 1.58052600e+09, 1.58061240e+09, 1.58069880e+09,
       1.58078520e+09, 1.58087160e+09, 1.58095800e+09, 1.58104440e+09,
       1.58113080e+09, 1.58139000e+09, 1.58147640e+09, 1.58156280e+09,
       1.58164920e+09, 1.58173560e+09, 1.58182200e+09, 1.58121720e+09,
       1.58130360e+09, 1.58190840e+09, 1.58199480e+09, 1.58208120e+09,
       1.58216760e+09, 1.58225400e+09, 1.58234040e+09, 1.58242680e+09,
       1.58268600e+09, 1.58251320e+09, 1.58259960e+09, 1.58277240e+09,
       1.58285880e+09, 1.58294520e+09])
```

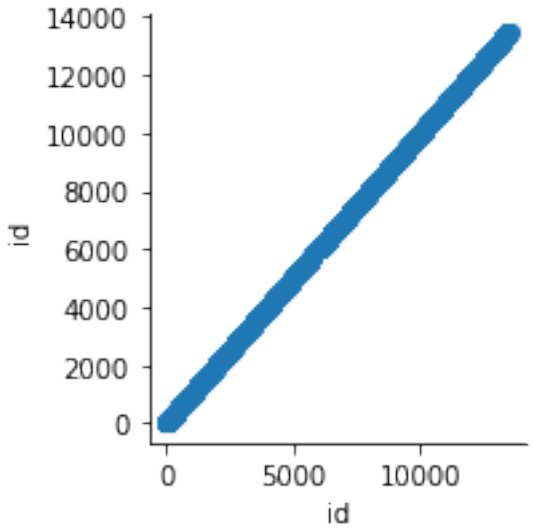
[17]:
```
scaler = preprocessing.StandardScaler()
data_scaler = scaler.fit_transform(X = corona, y = corona)
```

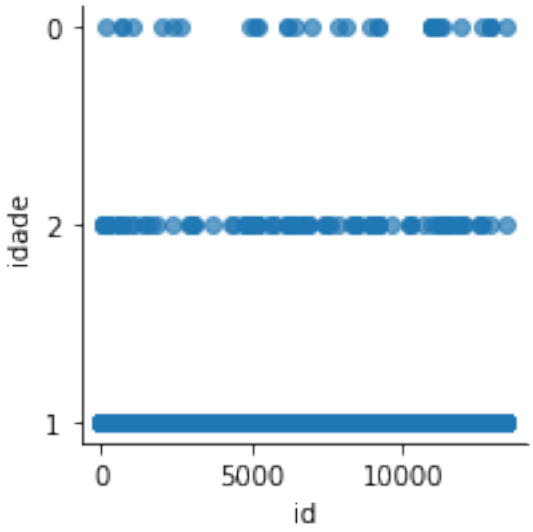
[18]:
```
data_scaler
```

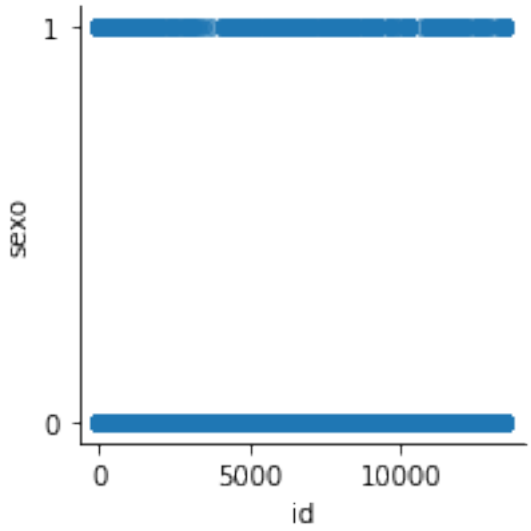
[18]:
```
array([[-1.71538996e+00, -6.57092214e-02, -1.96417914e-01,
        -4.27646790e+00, -4.58269348e+00, -1.56397784e+00],
       [-1.71513408e+00, -6.57092214e-02, -1.96417914e-01,
        -8.62573066e+00, -4.09085543e+00, -1.45778372e+00],
       [-1.71487820e+00, -6.57092214e-02, -1.96417914e-01,
        -5.90744143e+00, -4.58269348e+00, -1.45778372e+00],
       …,
       [ 1.72795199e+00, -6.57092214e-02,  5.09118533e+00,
        -1.50020985e-12,  0.00000000e+00,  2.36520465e+00],
       [ 1.73306954e+00, -6.57092214e-02,  5.09118533e+00,
        -1.50020985e-12,  0.00000000e+00,  2.36520465e+00],
       [ 1.73332542e+00, -6.57092214e-02,  5.09118533e+00,
        -1.50020985e-12,  0.00000000e+00,  2.47139877e+00]])
```

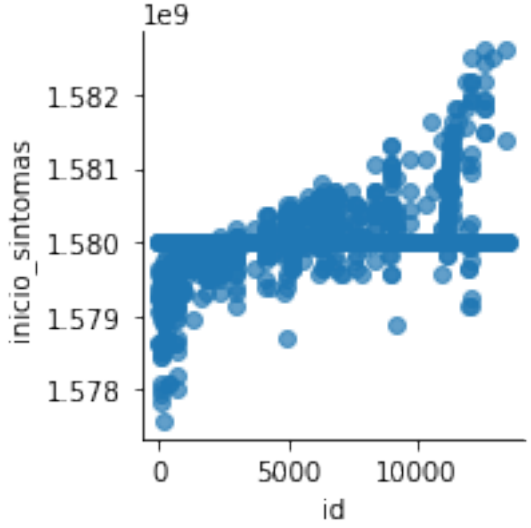
4 3. Visualização

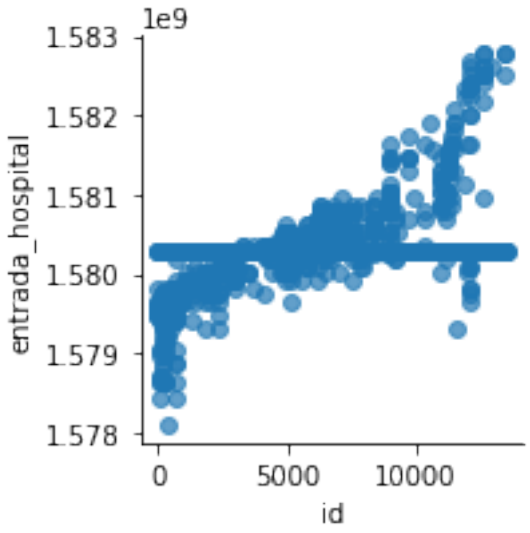
[19]:
```
for atributo1 in corona.columns:
    for atributo2 in corona.columns:
        g = sns.FacetGrid(corona, margin_titles=True)
        g.map(plt.scatter, atributo1, atributo2, alpha=.7)
        g.add_legend()
        plt.show()
```

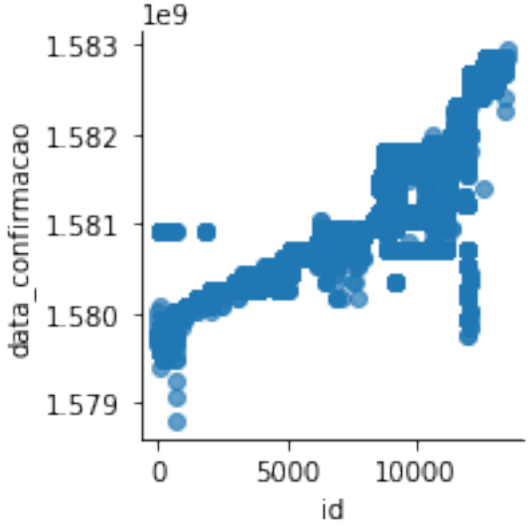

14000
12000
10000
8000
6000
4000
2000
0
id
0
5000
10000
id

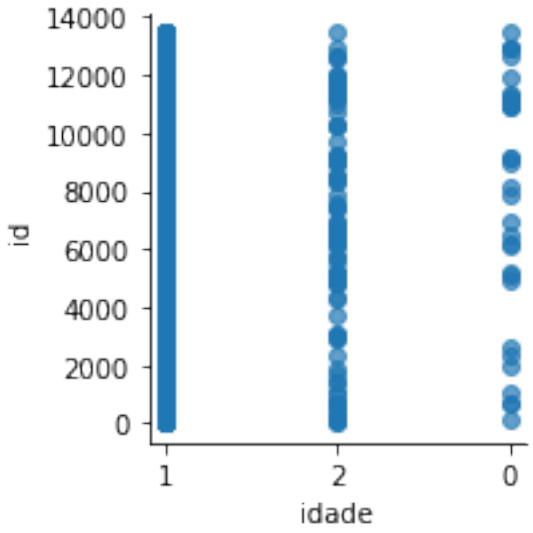

0
2
1
idade
0
5000
10000
id

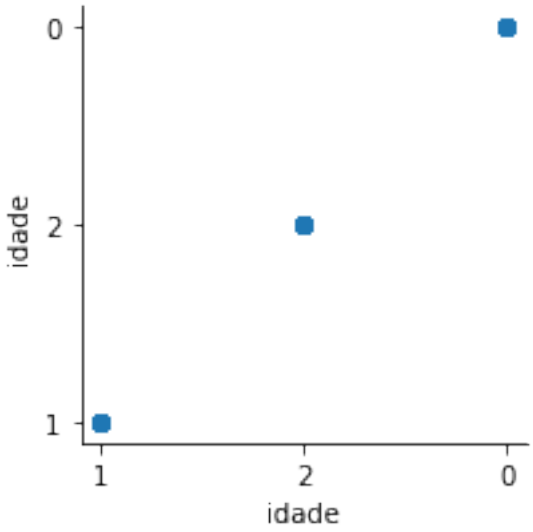

1
0
sexo
0
5000
10000
id

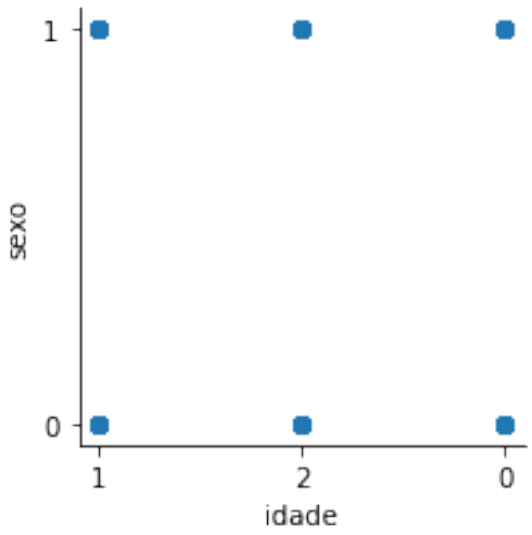

1e9
1.582
1.581
1.580
1.579
1.578
inicio_sintomas
0
5000
10000
id

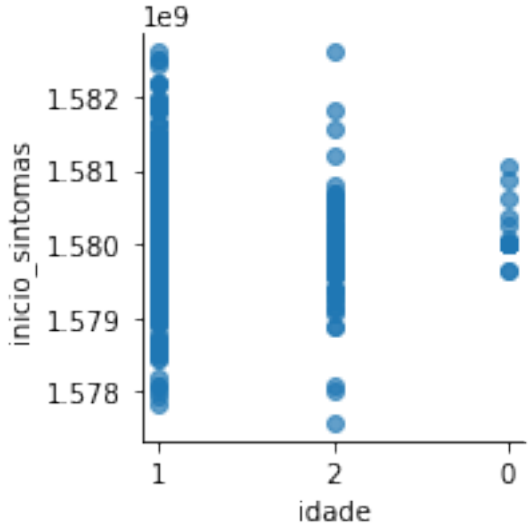

1e9
1.583
1.582
1.581
1.580
1.579
1.578
entrada_hospital
0
5000
10000
id

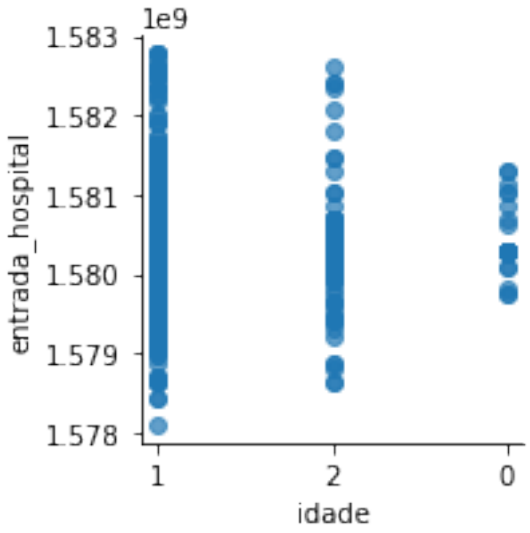

1e9
1.583
1.582
1.581
1.580
1.579
data_confirmacao
0
5000
10000
id

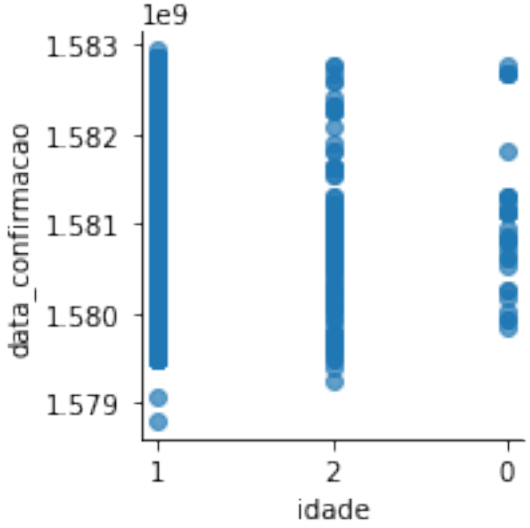

14000
12000
10000
8000
6000
4000
2000
0
id
1
2
0
idade

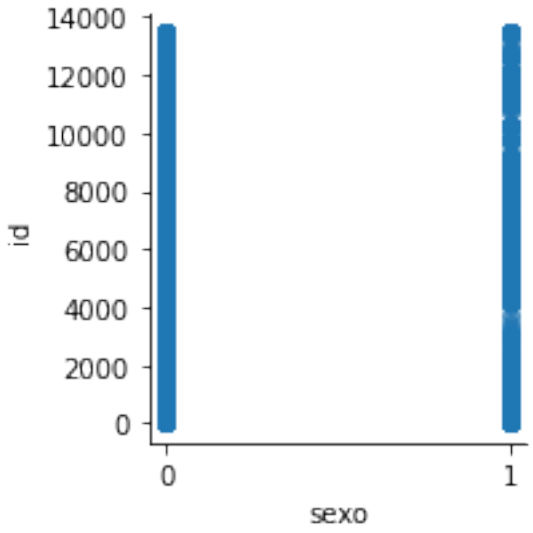

0
2
1
idade
1
2
0
idade

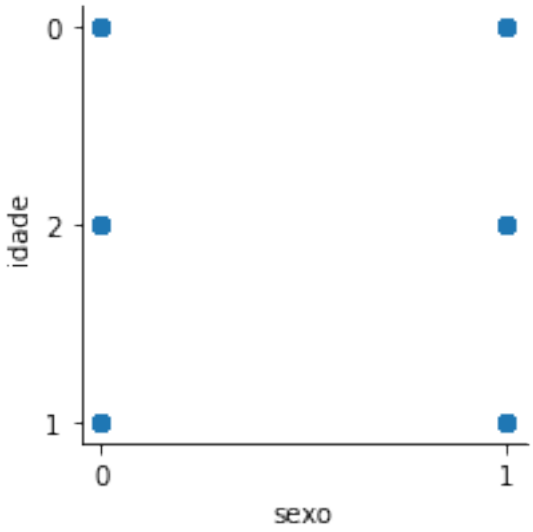

1
0
sexo
1
2
0
idade

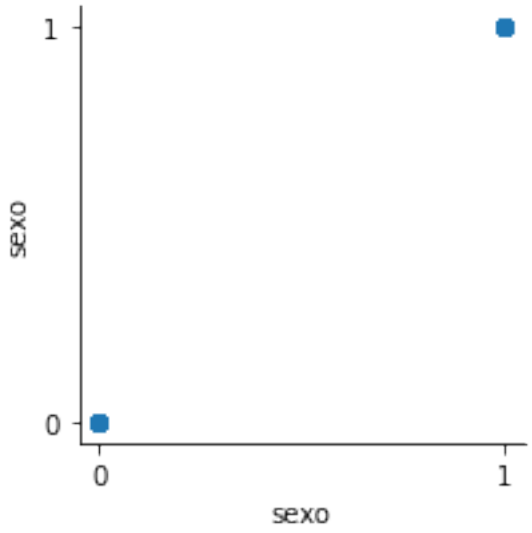

1e9
1.582
1.581
1.580
1.579
1.578
inicio_sintomas
1
2
0
idade

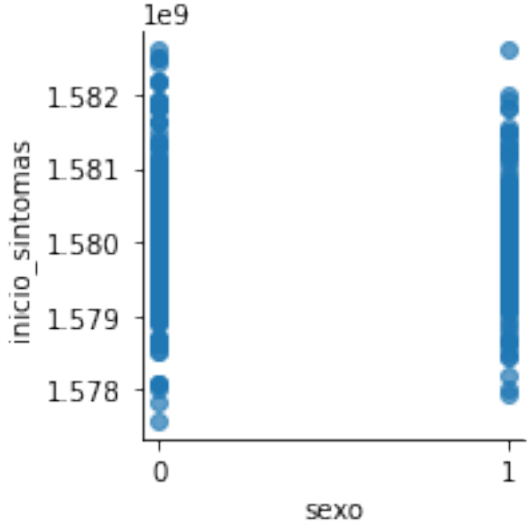

1e9
1.583
1.582
1.581
1.580
1.579
1.578
entrada_hospital
1
2
0
idade

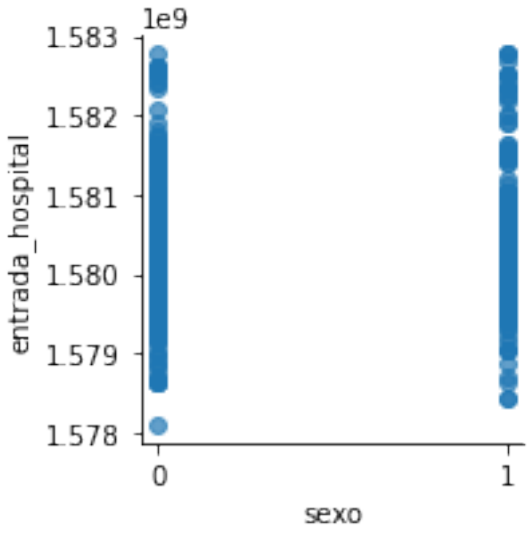

1e9
1.583
1.582
1.581
1.580
1.579
data_confirmacao
1
2
0
idade

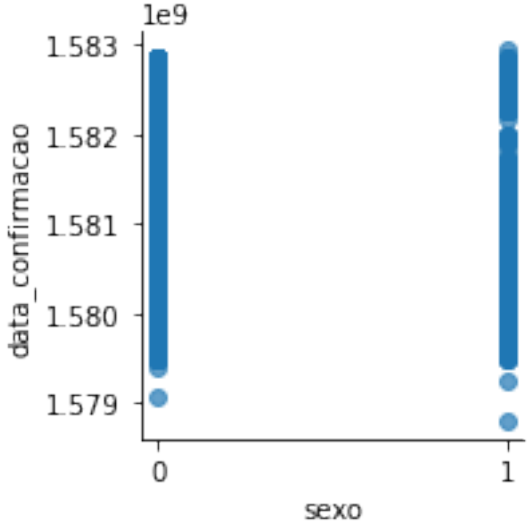

14000
12000
10000
8000
6000
4000
2000
0
id
0
1
sexo

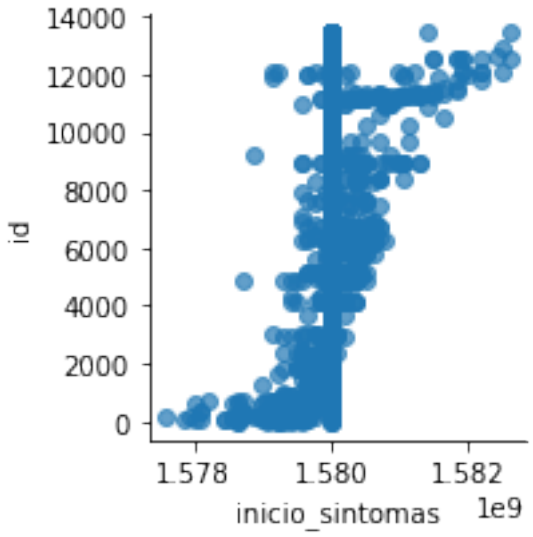

0
2
1
idade
0
1
sexo

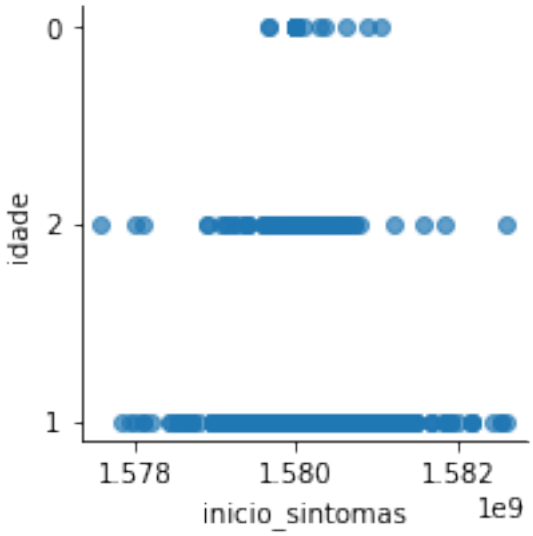

1
0
sexo
0
1
sexo

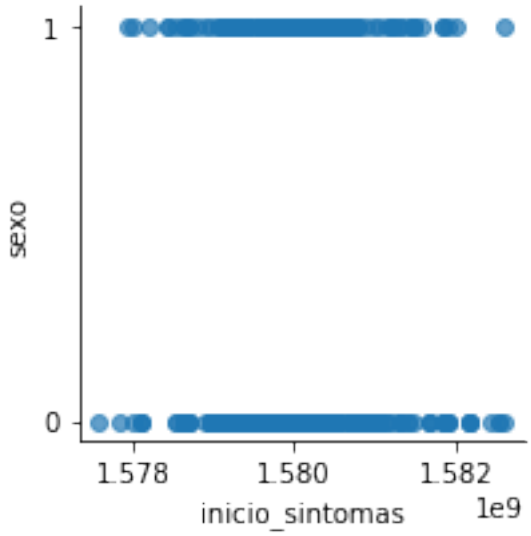

1e9
1.582
1.581
1.580
1.579
1.578
inicio_sintomas
0
1
sexo

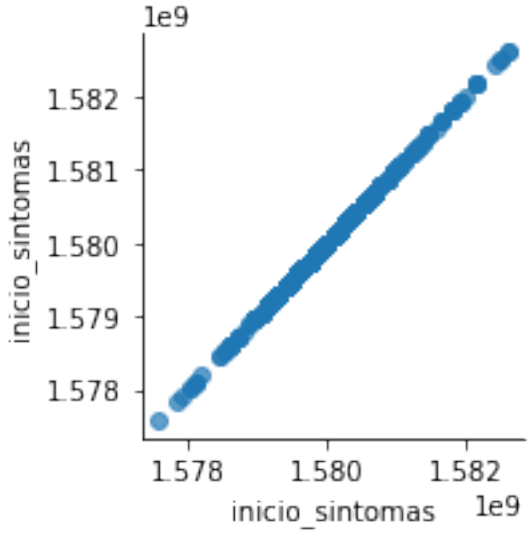

1e9
1.583
1.582
1.581
1.580
1.579
1.578
entrada_hospital
0
1
sexo

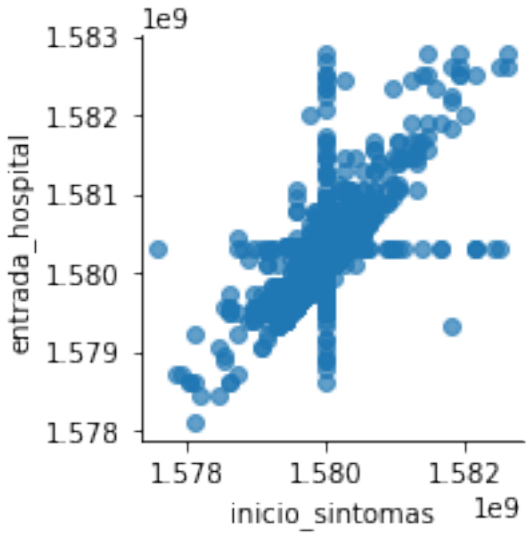

1e9
1.583
1.582
1.581
1.580
1.579
data_confirmacao
0
1
sexo

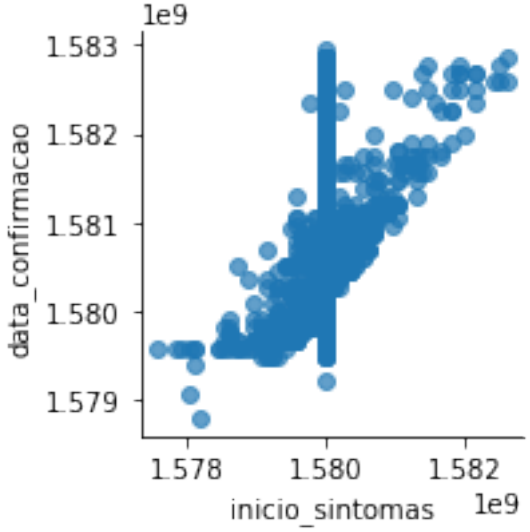

14000
12000
10000
8000
6000
4000
2000
0
id
1.578
1.580
1.582
inicio_sintomas
1e9

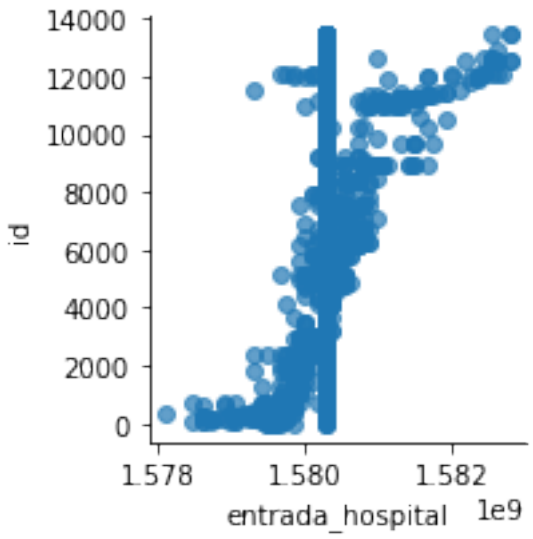

0
2
1
idade
1.578
1.580
1.582
inicio_sintomas
1e9

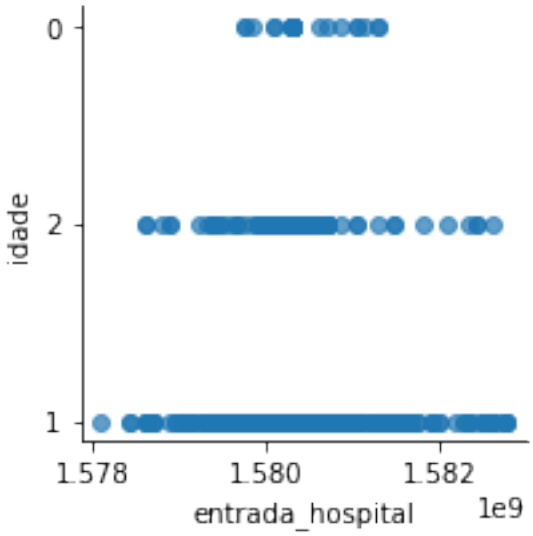

1
0
sexo
1.578
1.580
1.582
1e9
inicio_sintomas

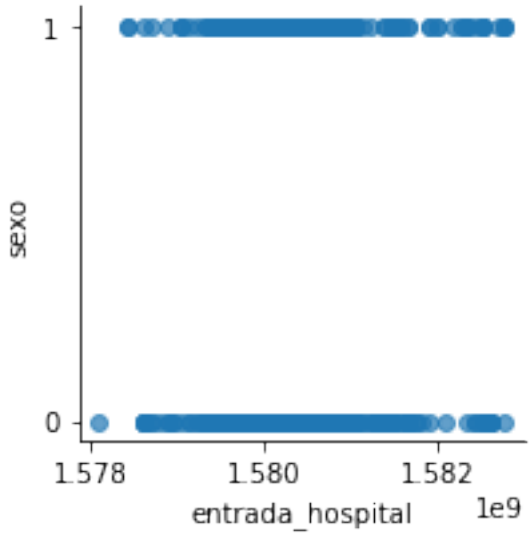

1e9
1.582
1.581
1.580
1.579
1.578
inicio_sintomas
1.578
1.580
1.582
1e9
inicio_sintomas

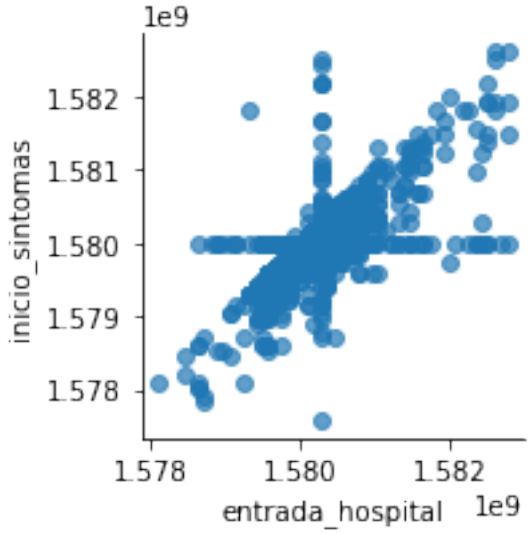

1e9
1.583
1.582
1.581
1.580
1.579
1.578
entrada_hospital
1.578
1.580
1.582
1e9
inicio_sintomas

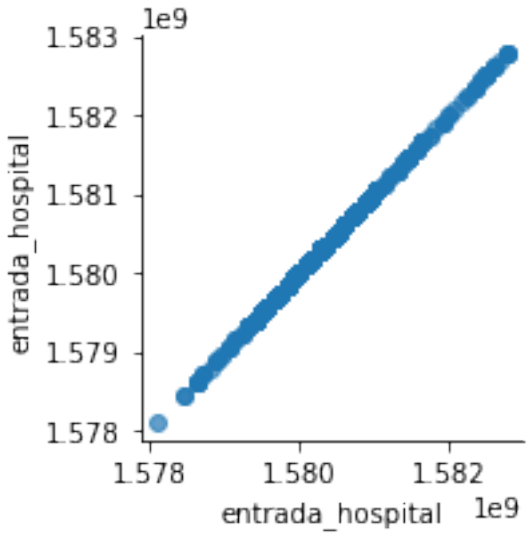

1e9
1.583
1.582
1.581
1.580
1.579
data_confirmacao
1.578
1.580
1.582
1e9
inicio_sintomas

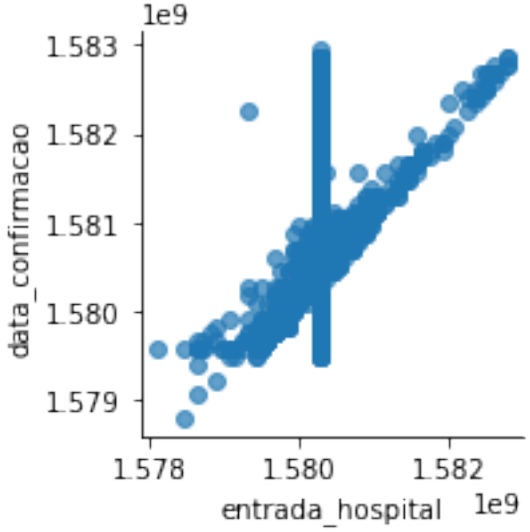

14000
12000
10000
8000
6000
4000
2000
0
id
1.578
1.580
1.582
entrada_hospital
1e9

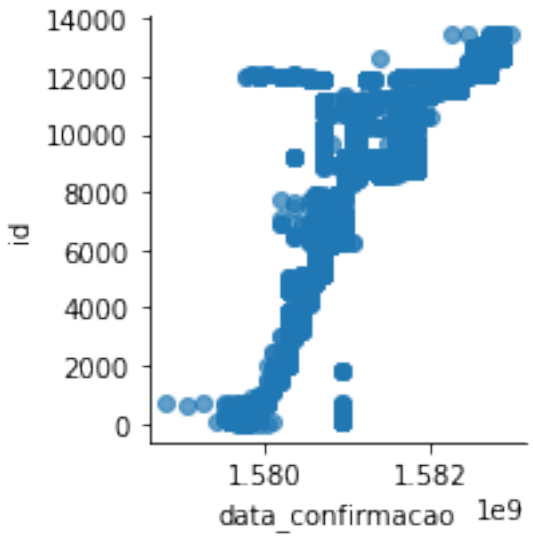

0
2
1
idade
1.578
1.580
1.582
entrada_hospital
1e9

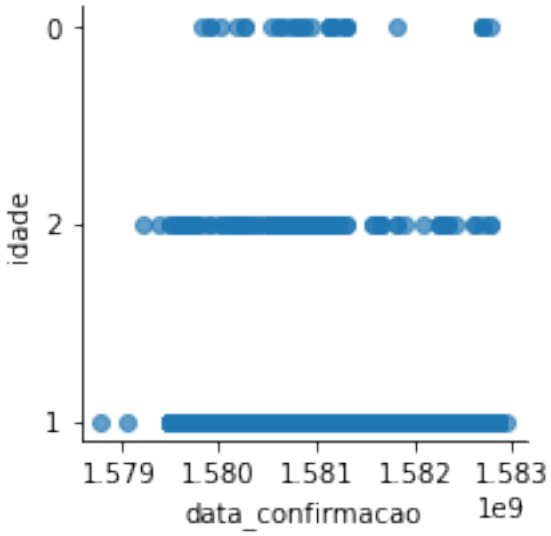

1
0
sexo
1.578
1.580
1.582
1e9
entrada_hospital

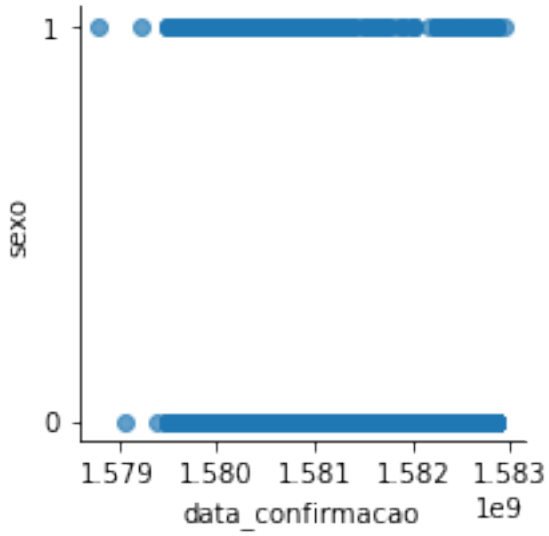

1e9
1.582
1.581
1.580
1.579
1.578
inicio_sintomas
1.578
1.580
1.582
1e9
entrada_hospital

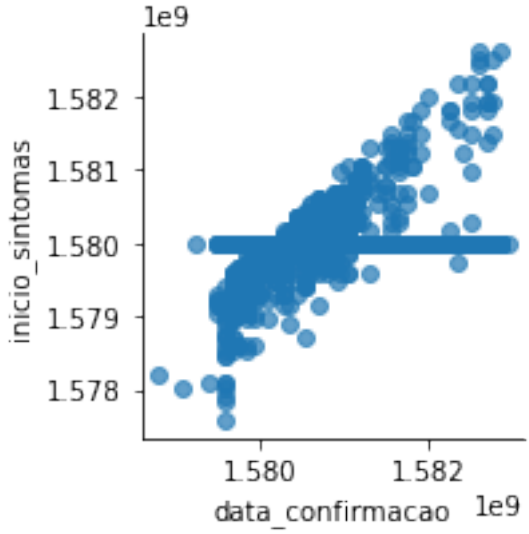

1e9
1.583
1.582
1.581
1.580
1.579
1.578
entrada_hospital
1.578
1.580
1.582
1e9
entrada_hospital

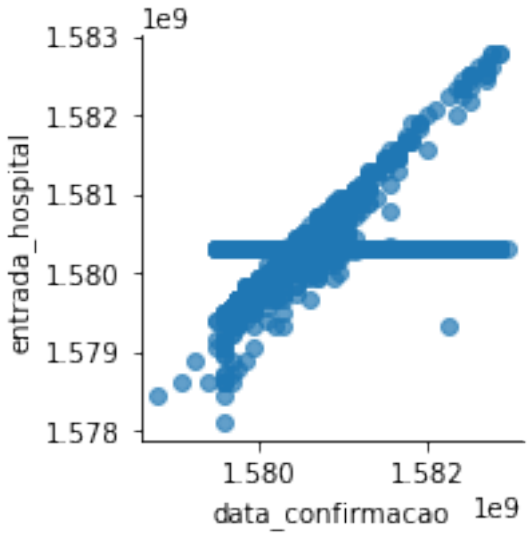

1e9
1.583
1.582
1.581
1.580
1.579
data_confirmacao
1.578
1.580
1.582
1e9
entrada_hospital

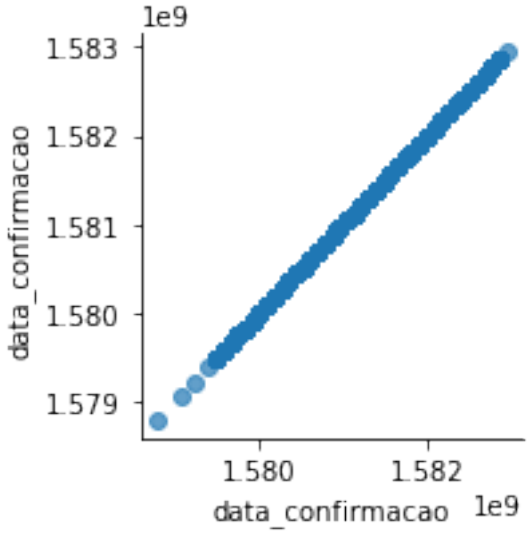

14000
12000
10000
8000
6000
4000
2000
0
id
1.580
1.582
data_confirmacao
1e9


0
2
1
idade
1.579
1.580
1.581
1.582
1.583
data_confirmacao
1e9


1
0
sexo
1.579
1.580
1.581
1.582
1.583
1e9
data_confirmacao

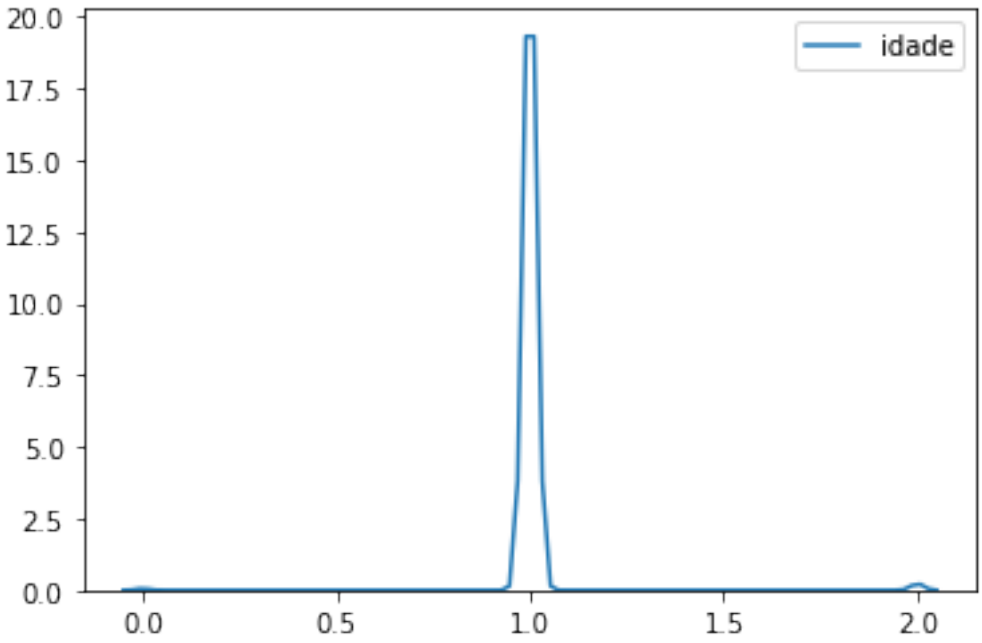

1e9
1.582
1.581
1.580
1.579
1.578
inicio_sintomas
1.580
1.582
data_confirmacao
1e9





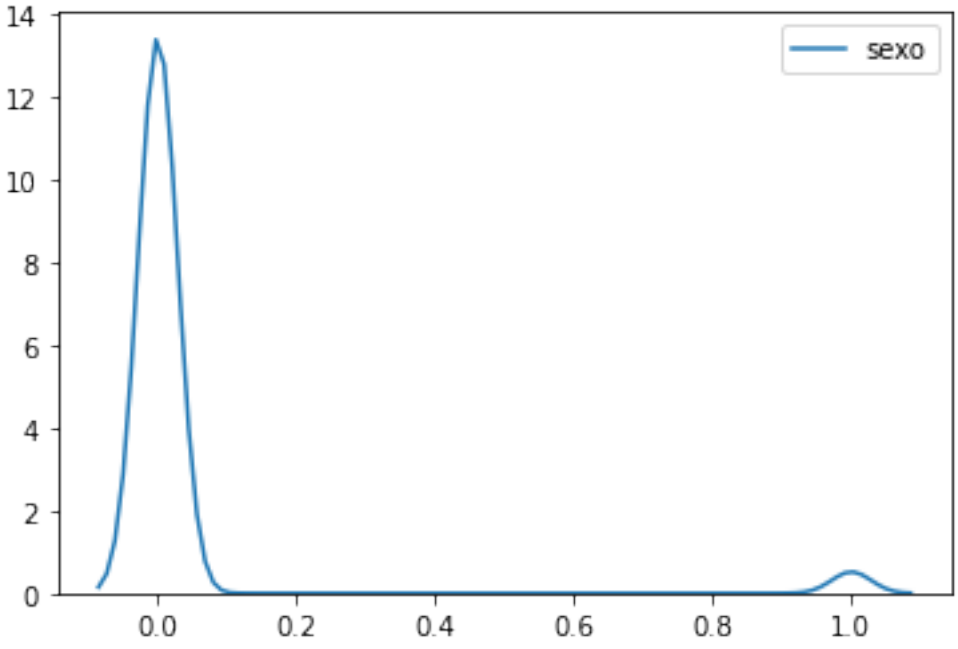
[20]:
```
sns.kdeplot(corona.idade)
```

[20]: <matplotlib.axes._subplots.AxesSubplot at 0x7f933f2101d0>



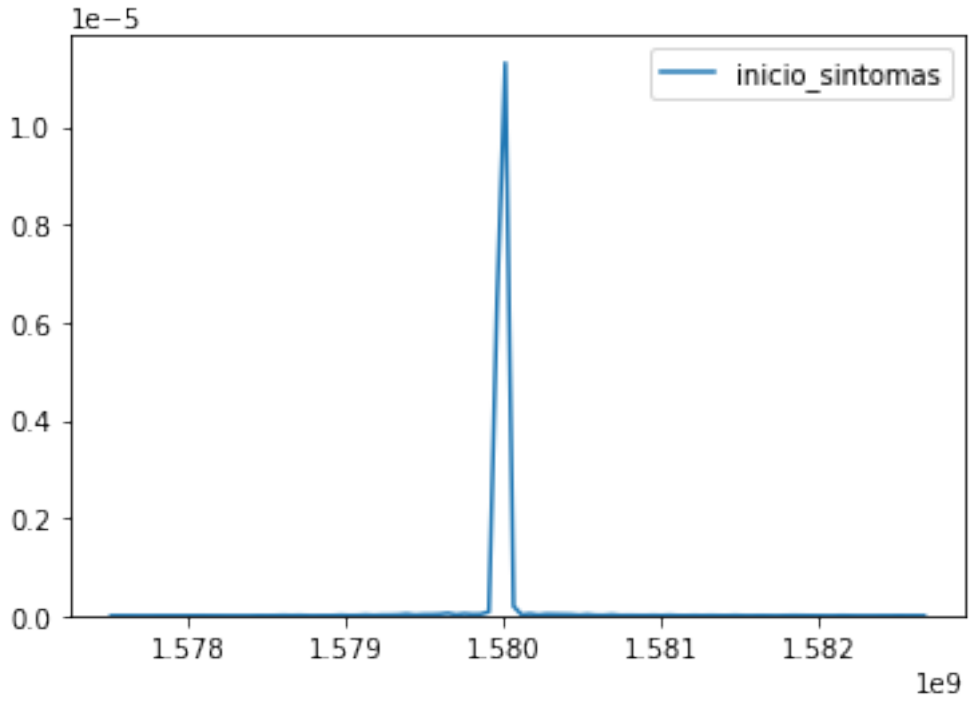
[21]:
```
sns.kdeplot(corona.sexo)
```

[21]:
```
<matplotlib.axes._subplots.AxesSubplot at 0x7f933c7d4e80>
```



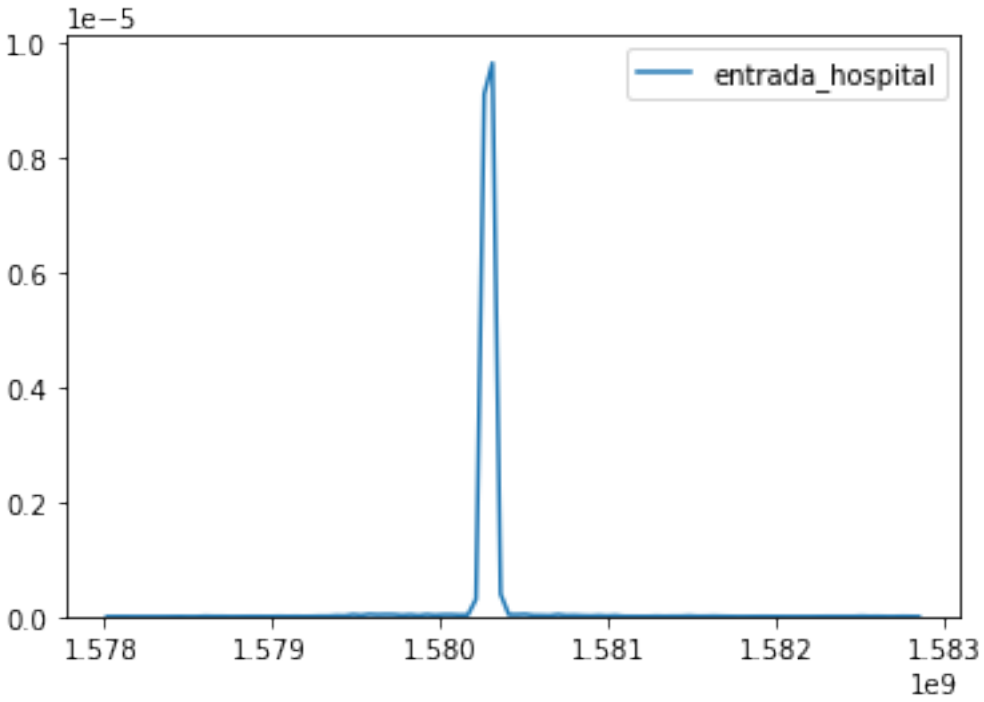
[22]:
```
sns.kdeplot(corona.inicio_sintomas)
```

[22]: <matplotlib.axes._subplots.AxesSubplot at 0x7f933effd208>



[23]:
```
sns.kdeplot(corona.entrada_hospital)
```

[23]: <matplotlib.axes._subplots.AxesSubplot at 0x7f933f172588>



[24]:
```
sns.kdeplot(corona.data_confirmacao)
```

[24]:
```
<matplotlib.axes._subplots.AxesSubplot at 0x7f933c73a6a0>
```