

September 19, 2023

# 1 NLP From Scratch: Classifying Names with a Character-Level RNN

## 1.1 Name by Gender

```
[65]: %matplotlib inline
      !pip install tqdm
```

Requirement already satisfied: tqdm in /usr/local/lib/python3.10/dist-packages (4.66.1)

```
[47]: from google.colab import drive
      drive.mount('/content/drive')
```

Drive already mounted at /content/drive; to attempt to forcibly remount, call drive.mount("/content/drive", force\_remount=True).

```
[48]: import csv
      import unicodedata
      import string

      all_letters = string.ascii_letters + " .,;'"
      n_letters = len(all_letters)

      def unicodeToAscii(s):
          return ''.join(
              c for c in unicodedata.normalize('NFD', s)
              if unicodedata.category(c) != 'Mn'
              and c in all_letters
          )

      nome_arquivo = '/content/drive/MyDrive/Colab Notebooks/Introdução à
      ↳Aprendizagem Profunda/data/name_gender.csv' # Substitua pelo nome do seu
      ↳arquivo
      category_lines = {"M": [], "F": []}

      with open(nome_arquivo, mode='r') as arquivo_csv:
```

```
[4]: print(category_lines['M'][:5])
```

```
['Aaban', 'Aabid', 'Adam', 'Aadan', 'Aadarsh']
```

### 1.1.1 Turning Names into Tensors

```
[49]: import torch

# Find letter index from all_letters, e.g. "a" = 0
def letterToIndex(letter):
    return all_letters.find(letter)

# Just for demonstration, turn a letter into a <1 x n_letters> Tensor
def letterToTensor(letter):
    tensor = torch.zeros(1, n_letters)
    tensor[0][letterToIndex(letter)] = 1
    return tensor

# Turn a line into a <line_length x 1 x n_letters>,
# or an array of one-hot letter vectors
def lineToTensor(line):
    tensor = torch.zeros(len(line), 1, n_letters)
    for li, letter in enumerate(line):
        tensor[li][0][letterToIndex(letter)] = 1
    return tensor

print(letterToTensor('J'))

print(lineToTensor('Jones').size())
```

[illegible]

```
torch.Size([5, 1, 57])
```

## 1.2 Creating the Network

```
[89]: import torch.nn as nn

class NameRNN(nn.Module):
    def __init__(self, input_size, hidden_size, output_size, num_layers=1,
        ↪rnn_type='lstm'):
        super(NameRNN, self).__init__()
        self.hidden_size = hidden_size
        self.num_layers = num_layers

        if rnn_type == 'lstm':
            self.rnn = nn.LSTM(input_size, hidden_size, num_layers)
        elif rnn_type == 'gru':
            self.rnn = nn.GRU(input_size, hidden_size, num_layers)

        self.fc1 = nn.Linear(hidden_size, 128)
        self.fc2 = nn.Linear(128, 64)
        self.fc3 = nn.Linear(64, output_size)
        self.softmax = nn.LogSoftmax(dim=1)

    def forward(self, input):
        h0 = torch.zeros(self.num_layers, input.size(1), self.hidden_size).
        ↪to(input.device)
        c0 = torch.zeros(self.num_layers, input.size(1), self.hidden_size).
        ↪to(input.device)

        out, _ = self.rnn(input, (h0, c0))
        out = out[-1]

        out = self.fc1(out)
        out = self.fc2(out)
        out = self.fc3(out)
        out = self.softmax(out)
        return out

hidden_size = 128
rnn = NameRNN(n_letters, hidden_size, n_categories, num_layers=2,
    ↪rnn_type='lstm')
```

## 1.3 Training

### 1.3.1 Training the Network

```
[99]: criterion = nn.NLLLoss()
optimizer = torch.optim.Adam(rnn.parameters(), lr=0.0005)

def train(category_tensor, line_tensor):
    optimizer.zero_grad()
    output = rnn(line_tensor)
    loss = criterion(output, category_tensor)
    loss.backward()
    optimizer.step()
    return output, loss.item()
```

```
[100]: import random
import time

def categoryFromOutput(output):
    top_n, top_i = output.topk(1)
    category_i = top_i[0].item()
    return all_categories[category_i], category_i

def randomTrainingExample():
    category = random.choice(all_categories)
    line = random.choice(category_lines[category])
    category_tensor = torch.tensor([all_categories.index(category)],
    dtype=torch.long)
    line_tensor = lineToTensor(line)
    return category, line, category_tensor, line_tensor
```

```
[101]: from tqdm import tqdm

n_iters = 100000
print_every = 5000
plot_every = 1000

current_loss = 0
all_losses = []

for iter in tqdm(range(1, n_iters + 1)):
    category, line, category_tensor, line_tensor = randomTrainingExample()
    output, loss = train(category_tensor, line_tensor)
    current_loss += loss

    if iter % print_every == 0:
        guess, guess_i = categoryFromOutput(output)
        correct = " " if guess == category else " (%s)" % category
```

```

        print('%d %d%% %.4f %s / %s %s' % (iter, iter / n_iters * 100, loss,
↪line, guess, correct))

    if iter % plot_every == 0:
        all_losses.append(current_loss / plot_every)
        current_loss = 0

```

```

5%|          | 5018/100000 [00:29<11:12, 141.15it/s]
5000 5% 0.1382 Benjimen / M
10%|         | 10022/100000 [00:58<11:07, 134.73it/s]
10000 10% 0.0048 Sandford / M
15%|         | 15025/100000 [01:29<11:06, 127.50it/s]
15000 15% 0.1660 Verdis / M
20%|         | 20022/100000 [01:57<09:34, 139.27it/s]
20000 20% 0.3201 Aleric / M
25%|         | 25016/100000 [02:27<09:43, 128.57it/s]
25000 25% 0.1761 Odel / M
30%|         | 30024/100000 [02:55<08:37, 135.16it/s]
30000 30% 0.1461 Sahit / M
35%|         | 35016/100000 [03:24<08:15, 131.19it/s]
35000 35% 0.0708 Kimetra / F
40%|         | 40016/100000 [03:53<06:51, 145.65it/s]
40000 40% 0.1769 Johnas / M
45%|         | 45021/100000 [04:21<06:48, 134.45it/s]
45000 45% 0.0953 Seidy / F
50%|         | 50025/100000 [04:50<06:14, 133.36it/s]
50000 50% 0.0957 Taiwon / M
55%|         | 55032/100000 [05:18<04:15, 176.15it/s]
55000 55% 0.5297 Healy / F
60%|         | 60035/100000 [05:47<03:15, 204.27it/s]
60000 60% 0.1095 Rashim / M
65%|         | 65023/100000 [06:16<04:09, 140.30it/s]
65000 65% 0.0220 Brenon / M
70%|         | 70013/100000 [06:45<03:27, 144.20it/s]

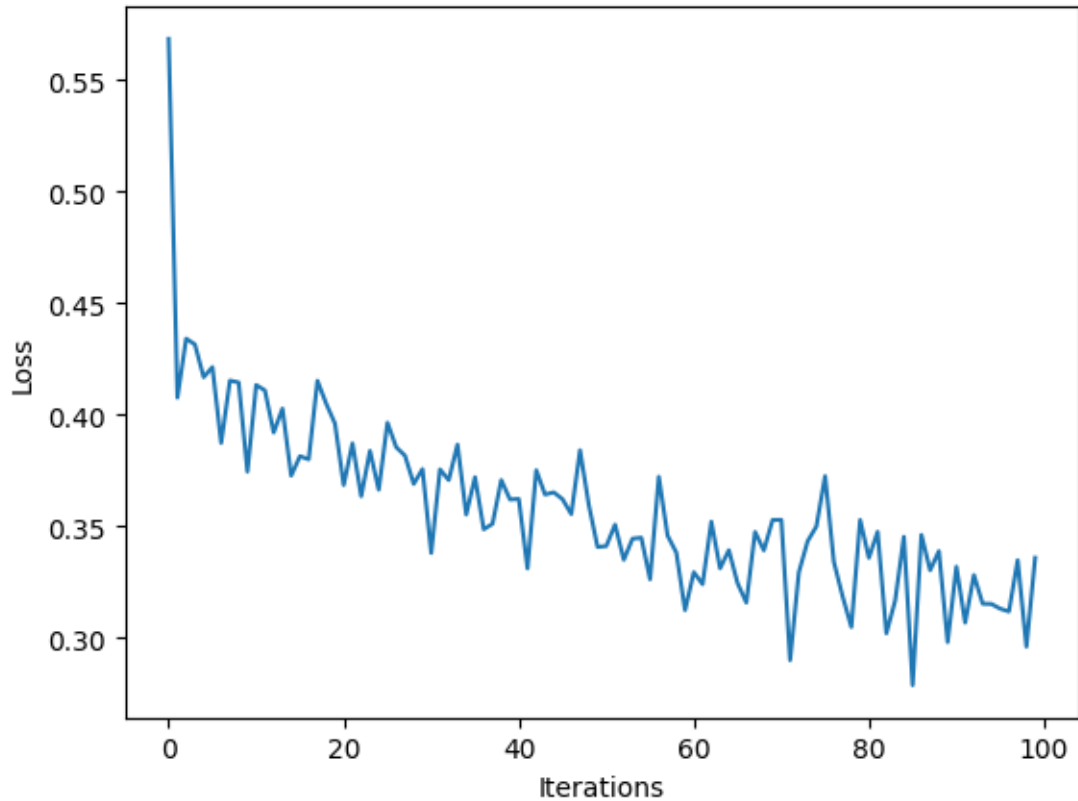
```

```
70000 70% 0.2531 Kaymarie / F
75%|      | 75022/100000 [07:14<02:45, 151.17it/s]
75000 75% 0.0455 Renda / F
80%|      | 80033/100000 [07:42<01:42, 195.12it/s]
80000 80% 0.0188 Ayleah / F
85%|      | 85035/100000 [08:11<01:15, 198.89it/s]
85000 85% 0.0058 Tarkeshia / F
90%|      | 90036/100000 [08:39<00:49, 203.02it/s]
90000 90% 0.0313 Sonjia / F
95%|      | 95024/100000 [09:07<00:25, 191.42it/s]
95000 95% 0.0428 Colgan / M
100%|     | 100000/100000 [09:35<00:00, 173.65it/s]
100000 100% 0.3080 Vashanti / F
```

### 1.3.2 Plotting the Results

```
[102]: import matplotlib.pyplot as plt
import matplotlib.ticker as ticker

plt.figure()
plt.plot(all_losses)
plt.xlabel('Iterations')
plt.ylabel('Loss')
plt.show()
```



## 1.4 Evaluating the Results

```
[103]: confusion = torch.zeros(n_categories, n_categories)
n_confusion = 10000

for i in range(n_confusion):
    category, line, category_tensor, line_tensor = randomTrainingExample()
    output = rnn(line_tensor)
    guess, guess_i = categoryFromOutput(output)
    category_i = all_categories.index(category)
    confusion[category_i][guess_i] += 1

for i in range(n_categories):
    confusion[i] = confusion[i] / confusion[i].sum()

fig = plt.figure()
ax = fig.add_subplot(111)
cax = ax.matshow(confusion.numpy())
fig.colorbar(cax)

ax.set_xticklabels([''] + all_categories, rotation=90)
```

```

ax.set_yticklabels([''] + all_categories)

ax.xaxis.set_major_locator(ticker.MultipleLocator(1))
ax.yaxis.set_major_locator(ticker.MultipleLocator(1))

plt.xlabel('Predicted')
plt.ylabel('True')
plt.title('Confusion Matrix')
plt.show()

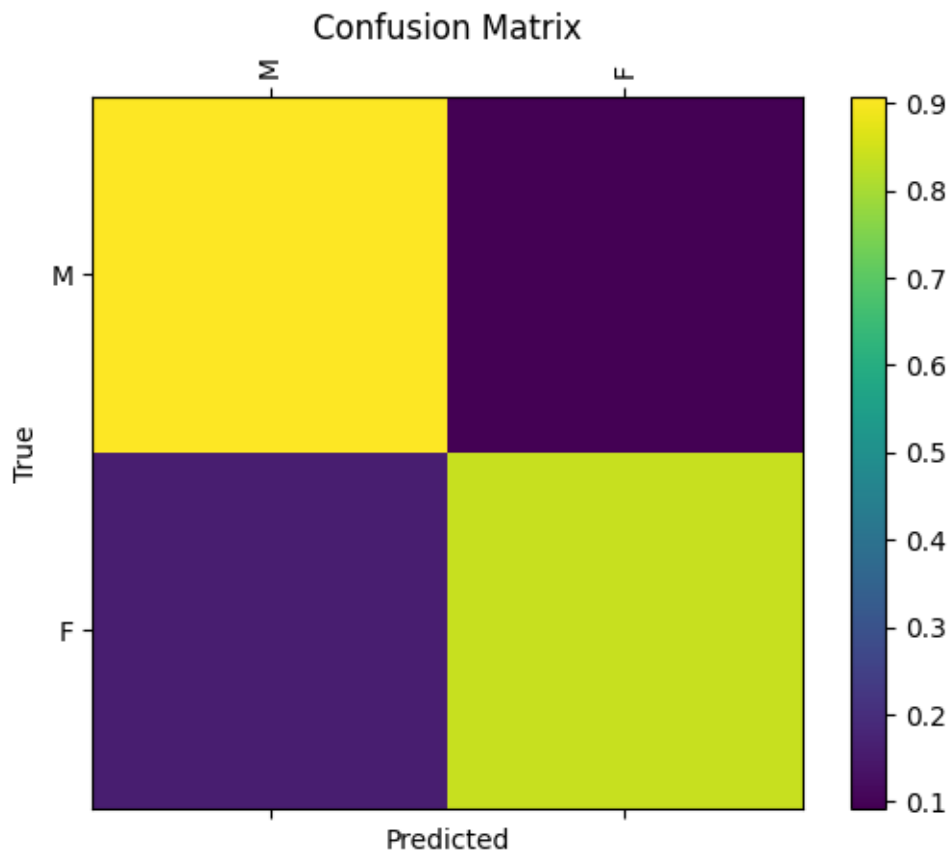
```

<ipython-input-103-cf7c0f795f9f>:19: UserWarning: FixedFormatter should only be used together with FixedLocator

```
ax.set_xticklabels([''] + all_categories, rotation=90)
```

<ipython-input-103-cf7c0f795f9f>:20: UserWarning: FixedFormatter should only be used together with FixedLocator

```
ax.set_yticklabels([''] + all_categories)
```





### 1.4.1 Running on User Input

```
[104]: def predict(input_line, n_predictions=2):
        print('\n> %s' % input_line)
        with torch.no_grad():
            output = rnn(lineToTensor(input_line))
            # Get top N categories
            topv, topi = output.topk(n_predictions, 1, True)
            predictions = []

            for i in range(n_predictions):
                value = topv[0][i].item()
                category_index = topi[0][i].item()
                print('("%.2f) %s' % (value, all_categories[category_index]))
                predictions.append([value, all_categories[category_index]])

# Make predictions
predict('John')
predict('Mary')
predict('Linda')
```

```
> John
(-0.04) M
(-3.17) F
```

```
> Mary
(-0.60) F
(-0.79) M
```

```
> Linda
(-0.03) F
(-3.68) M
```

#Salvar em PDF

```
[ ]: !apt-get install texlive texlive-xetex texlive-latex-extra pandoc
!pip install pypandoc
```

```
Reading package lists... Done
Building dependency tree... Done
Reading state information... Done
pandoc is already the newest version (2.9.2.1-3ubuntu2).
pandoc set to manually installed.
The following additional packages will be installed:
  dvipngm fonts-droid-fallback fonts-lato fonts-lmodern fonts-noto-mono
  fonts-texgyre fonts-urw-base35 libapache-pom-java libcommons-logging-java
  libcommons-parent-java libfontbox-java libfontenc1 libgs9 libgs9-common
  libidn12 libijs-0.35 libjbig2dec0 libkpathsea6 libpdfbox-java libptexenc1
```

libruby3.0 libsyntax2 libteckit0 libtexlua53 libtexluajit2 libwoff1  
libzip-0-13 lmodern poppler-data preview-latex-style rake ruby  
ruby-net-telnet ruby-rubygems ruby-webrick ruby-xmlrpc ruby3.0  
rubygems-integration tlutils teckit tex-common tex-gyre texlive-base  
texlive-binaries texlive-fonts-recommended texlive-latex-base  
texlive-latex-recommended texlive-pictures texlive-plain-generic tipa  
xfonts-encodings xfonts-utils

Suggested packages:

fonts-noto fonts-freefont-otf | fonts-freefont-ttf libavalon-framework-java  
libcommons-logging-java-doc libexcalibur-logkit-java liblog4j1.2-java  
poppler-utils ghostscript fonts-japanese-mincho | fonts-ipafont-mincho  
fonts-japanese-gothic | fonts-ipafont-gothic fonts-arphic-ukai  
fonts-arphic-uming fonts-nanum ri ruby-dev bundler debhelper gv  
| postscript-viewer perl-tk xpdf | pdf-viewer xzdec  
texlive-fonts-recommended-doc texlive-latex-base-doc python3-pygments  
icc-profiles libfile-which-perl libspreadsheet-parseexcel-perl  
texlive-latex-extra-doc texlive-latex-recommended-doc texlive-luatex  
texlive-pstricks dot2tex prerex texlive-pictures-doc vprerex  
default-jre-headless tipa-doc

The following NEW packages will be installed:

dvisvgm fonts-droid-fallback fonts-lato fonts-lmodern fonts-noto-mono  
fonts-texgyre fonts-urw-base35 libapache-pom-java libcommons-logging-java  
libcommons-parent-java libfontbox-java libfontenc1 libgs9 libgs9-common  
libidn12 libijs-0.35 libjbig2dec0 libkpathsea6 libpdfbox-java libptexenc1  
libruby3.0 libsyntax2 libteckit0 libtexlua53 libtexluajit2 libwoff1  
libzip-0-13 lmodern poppler-data preview-latex-style rake ruby  
ruby-net-telnet ruby-rubygems ruby-webrick ruby-xmlrpc ruby3.0  
rubygems-integration tlutils teckit tex-common tex-gyre texlive texlive-base  
texlive-binaries texlive-fonts-recommended texlive-latex-base  
texlive-latex-extra texlive-latex-recommended texlive-pictures  
texlive-plain-generic texlive-xetex tipa xfonts-encodings xfonts-utils

0 upgraded, 55 newly installed, 0 to remove and 18 not upgraded.

Need to get 182 MB of archives.

After this operation, 572 MB of additional disk space will be used.

Get:1 <http://archive.ubuntu.com/ubuntu/jammy/main amd64 fonts-droid-fallback all 1:6.0.1r16-1.1build1> [1,805 kB]

Get:2 <http://archive.ubuntu.com/ubuntu/jammy/main amd64 fonts-lato all 2.0-2.1> [2,696 kB]

Get:3 <http://archive.ubuntu.com/ubuntu/jammy/main amd64 poppler-data all 0.4.11-1> [2,171 kB]

Get:4 <http://archive.ubuntu.com/ubuntu/jammy/universe amd64 tex-common all 6.17> [33.7 kB]

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Get:6 <http://archive.ubuntu.com/ubuntu/jammy-updates/main amd64 libgs9-common all 9.55.0-dfsg1-0ubuntu5.4> [752 kB]

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Get:9 <http://archive.ubuntu.com/ubuntu> jammy/main amd64 libjbig2dec0 amd64 0.19-3build2 [64.7 kB]  
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Get:14 <http://archive.ubuntu.com/ubuntu> jammy/universe amd64 fonts-lmodern all 2.004.5-6.1 [4,532 kB]  
Get:15 <http://archive.ubuntu.com/ubuntu> jammy/main amd64 fonts-noto-mono all 20201225-1build1 [397 kB]  
Get:16 <http://archive.ubuntu.com/ubuntu> jammy/universe amd64 fonts-texgyre all 20180621-3.1 [10.2 MB]  
Get:17 <http://archive.ubuntu.com/ubuntu> jammy/universe amd64 libapache-pom-java all 18-1 [4,720 B]  
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Get:19 <http://archive.ubuntu.com/ubuntu> jammy/universe amd64 libcommons-logging-java all 1.2-2 [60.3 kB]  
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Get:53 <http://archive.ubuntu.com/ubuntu> jammy/universe amd64 texlive-plain-generic all 2021.20220204-1 [27.5 MB]  
Get:54 <http://archive.ubuntu.com/ubuntu> jammy/universe amd64 tipa all 2:1.3-21 [2,967 kB]  
Get:55 <http://archive.ubuntu.com/ubuntu> jammy/universe amd64 texlive-xetex all 2021.20220204-1 [12.4 MB]

```

Fetched 182 MB in 26s (6,988 kB/s)
Extracting templates from packages: 100%
Preconfiguring packages ...
Selecting previously unselected package fonts-droid-fallback.
(Reading database ... 120901 files and directories currently installed.)
Preparing to unpack .../00-fonts-droid-fallback_1%3a6.0.1r16-1.1build1_all.deb
...
Unpacking fonts-droid-fallback (1:6.0.1r16-1.1build1) ...
Selecting previously unselected package fonts-lato.
Preparing to unpack .../01-fonts-lato_2.0-2.1_all.deb ...
Unpacking fonts-lato (2.0-2.1) ...
Selecting previously unselected package poppler-data.
Preparing to unpack .../02-poppler-data_0.4.11-1_all.deb ...
Unpacking poppler-data (0.4.11-1) ...
Selecting previously unselected package tex-common.
Preparing to unpack .../03-tex-common_6.17_all.deb ...
Unpacking tex-common (6.17) ...
Selecting previously unselected package fonts-urw-base35.
Preparing to unpack .../04-fonts-urw-base35_20200910-1_all.deb ...
Unpacking fonts-urw-base35 (20200910-1) ...
Selecting previously unselected package libgs9-common.
Preparing to unpack .../05-libgs9-common_9.55.0~dfsg1-0ubuntu5.4_all.deb ...
Unpacking libgs9-common (9.55.0~dfsg1-0ubuntu5.4) ...
Selecting previously unselected package libidn12:amd64.
Preparing to unpack .../06-libidn12_1.38-4ubuntu1_amd64.deb ...
Unpacking libidn12:amd64 (1.38-4ubuntu1) ...
Selecting previously unselected package libijs-0.35:amd64.
Preparing to unpack .../07-libijs-0.35_0.35-15build2_amd64.deb ...
Unpacking libijs-0.35:amd64 (0.35-15build2) ...
Selecting previously unselected package libjbig2dec0:amd64.
Preparing to unpack .../08-libjbig2dec0_0.19-3build2_amd64.deb ...
Unpacking libjbig2dec0:amd64 (0.19-3build2) ...
Selecting previously unselected package libgs9:amd64.
Preparing to unpack .../09-libgs9_9.55.0~dfsg1-0ubuntu5.4_amd64.deb ...
Unpacking libgs9:amd64 (9.55.0~dfsg1-0ubuntu5.4) ...
Selecting previously unselected package libkpathsea6:amd64.
Preparing to unpack .../10-libkpathsea6_2021.20210626.59705-1ubuntu0.1_amd64.deb
...
Unpacking libkpathsea6:amd64 (2021.20210626.59705-1ubuntu0.1) ...
Selecting previously unselected package libwoff1:amd64.
Preparing to unpack .../11-libwoff1_1.0.2-1build4_amd64.deb ...
Unpacking libwoff1:amd64 (1.0.2-1build4) ...
Selecting previously unselected package dvisvgm.
Preparing to unpack .../12-dvisvgm_2.13.1-1_amd64.deb ...
Unpacking dvisvgm (2.13.1-1) ...
Selecting previously unselected package fonts-lmodern.
Preparing to unpack .../13-fonts-lmodern_2.004.5-6.1_all.deb ...
Unpacking fonts-lmodern (2.004.5-6.1) ...

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Selecting previously unselected package fonts-noto-mono.
Preparing to unpack .../14-fonts-noto-mono_20201225-1build1_all.deb ...
Unpacking fonts-noto-mono (20201225-1build1) ...
Selecting previously unselected package fonts-texgyre.
Preparing to unpack .../15-fonts-texgyre_20180621-3.1_all.deb ...
Unpacking fonts-texgyre (20180621-3.1) ...
Selecting previously unselected package libapache-pom-java.
Preparing to unpack .../16-libapache-pom-java_18-1_all.deb ...
Unpacking libapache-pom-java (18-1) ...
Selecting previously unselected package libcommons-parent-java.
Preparing to unpack .../17-libcommons-parent-java_43-1_all.deb ...
Unpacking libcommons-parent-java (43-1) ...
Selecting previously unselected package libcommons-logging-java.
Preparing to unpack .../18-libcommons-logging-java_1.2-2_all.deb ...
Unpacking libcommons-logging-java (1.2-2) ...
Selecting previously unselected package libfontenc1:amd64.
Preparing to unpack .../19-libfontenc1_1%3a1.1.4-1build3_amd64.deb ...
Unpacking libfontenc1:amd64 (1:1.1.4-1build3) ...
Selecting previously unselected package libptexenc1:amd64.
Preparing to unpack .../20-libptexenc1_2021.20210626.59705-1ubuntu0.1_amd64.deb
...
Unpacking libptexenc1:amd64 (2021.20210626.59705-1ubuntu0.1) ...
Selecting previously unselected package rubygems-integration.
Preparing to unpack .../21-rubygems-integration_1.18_all.deb ...
Unpacking rubygems-integration (1.18) ...
Selecting previously unselected package ruby3.0.
Preparing to unpack .../22-ruby3.0_3.0.2-7ubuntu2.4_amd64.deb ...
Unpacking ruby3.0 (3.0.2-7ubuntu2.4) ...
Selecting previously unselected package ruby-rubygems.
Preparing to unpack .../23-ruby-rubygems_3.3.5-2_all.deb ...
Unpacking ruby-rubygems (3.3.5-2) ...
Selecting previously unselected package ruby.
Preparing to unpack .../24-ruby_1%3a3.0~exp1_amd64.deb ...
Unpacking ruby (1:3.0~exp1) ...
Selecting previously unselected package rake.
Preparing to unpack .../25-rake_13.0.6-2_all.deb ...
Unpacking rake (13.0.6-2) ...
Selecting previously unselected package ruby-net-telnet.
Preparing to unpack .../26-ruby-net-telnet_0.1.1-2_all.deb ...
Unpacking ruby-net-telnet (0.1.1-2) ...
Selecting previously unselected package ruby-webrick.
Preparing to unpack .../27-ruby-webrick_1.7.0-3_all.deb ...
Unpacking ruby-webrick (1.7.0-3) ...
Selecting previously unselected package ruby-xmlrpc.
Preparing to unpack .../28-ruby-xmlrpc_0.3.2-1ubuntu0.1_all.deb ...
Unpacking ruby-xmlrpc (0.3.2-1ubuntu0.1) ...
Selecting previously unselected package libruby3.0:amd64.
Preparing to unpack .../29-libruby3.0_3.0.2-7ubuntu2.4_amd64.deb ...

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Unpacking libruby3.0:amd64 (3.0.2-7ubuntu2.4) ...
Selecting previously unselected package libsyntax2:amd64.
Preparing to unpack .../30-libsyntax2_2021.20210626.59705-1ubuntu0.1_amd64.deb
...
Unpacking libsyntax2:amd64 (2021.20210626.59705-1ubuntu0.1) ...
Selecting previously unselected package libteckit0:amd64.
Preparing to unpack .../31-libteckit0_2.5.11+ds1-1_amd64.deb ...
Unpacking libteckit0:amd64 (2.5.11+ds1-1) ...
Selecting previously unselected package libtexlua53:amd64.
Preparing to unpack .../32-libtexlua53_2021.20210626.59705-1ubuntu0.1_amd64.deb
...
Unpacking libtexlua53:amd64 (2021.20210626.59705-1ubuntu0.1) ...
Selecting previously unselected package libtexluajit2:amd64.
Preparing to unpack
.../33-libtexluajit2_2021.20210626.59705-1ubuntu0.1_amd64.deb ...
Unpacking libtexluajit2:amd64 (2021.20210626.59705-1ubuntu0.1) ...
Selecting previously unselected package libzip-0-13:amd64.
Preparing to unpack .../34-libzip-0-13_0.13.7+dfsg.1-1.1_amd64.deb ...
Unpacking libzip-0-13:amd64 (0.13.7+dfsg.1-1.1) ...
Selecting previously unselected package xfonts-encodings.
Preparing to unpack .../35-xfonts-encodings_1%3a1.0.5-0ubuntu2_all.deb ...
Unpacking xfonts-encodings (1:1.0.5-0ubuntu2) ...
Selecting previously unselected package xfonts-utils.
Preparing to unpack .../36-xfonts-utils_1%3a7.7+6build2_amd64.deb ...
Unpacking xfonts-utils (1:7.7+6build2) ...
Selecting previously unselected package lmodern.
Preparing to unpack .../37-lmodern_2.004.5-6.1_all.deb ...
Unpacking lmodern (2.004.5-6.1) ...
Selecting previously unselected package preview-latex-style.
Preparing to unpack .../38-preview-latex-style_12.2-1ubuntu1_all.deb ...
Unpacking preview-latex-style (12.2-1ubuntu1) ...
Selecting previously unselected package t1utils.
Preparing to unpack .../39-t1utils_1.41-4build2_amd64.deb ...
Unpacking t1utils (1.41-4build2) ...
Selecting previously unselected package teckit.
Preparing to unpack .../40-teckit_2.5.11+ds1-1_amd64.deb ...
Unpacking teckit (2.5.11+ds1-1) ...
Selecting previously unselected package tex-gyre.
Preparing to unpack .../41-tex-gyre_20180621-3.1_all.deb ...
Unpacking tex-gyre (20180621-3.1) ...
Selecting previously unselected package texlive-binaries.
Preparing to unpack .../42-texlive-
binaries_2021.20210626.59705-1ubuntu0.1_amd64.deb ...
Unpacking texlive-binaries (2021.20210626.59705-1ubuntu0.1) ...
Selecting previously unselected package texlive-base.
Preparing to unpack .../43-texlive-base_2021.20220204-1_all.deb ...
Unpacking texlive-base (2021.20220204-1) ...
Selecting previously unselected package texlive-fonts-recommended.

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Preparing to unpack .../44-texlive-fonts-recommended_2021.20220204-1_all.deb ...
Unpacking texlive-fonts-recommended (2021.20220204-1) ...
Selecting previously unselected package texlive-latex-base.
Preparing to unpack .../45-texlive-latex-base_2021.20220204-1_all.deb ...
Unpacking texlive-latex-base (2021.20220204-1) ...
Selecting previously unselected package texlive-latex-recommended.
Preparing to unpack .../46-texlive-latex-recommended_2021.20220204-1_all.deb ...
Unpacking texlive-latex-recommended (2021.20220204-1) ...
Selecting previously unselected package texlive.
Preparing to unpack .../47-texlive_2021.20220204-1_all.deb ...
Unpacking texlive (2021.20220204-1) ...
Selecting previously unselected package libfontbox-java.
Preparing to unpack .../48-libfontbox-java_1%3a1.8.16-2_all.deb ...
Unpacking libfontbox-java (1:1.8.16-2) ...
Selecting previously unselected package libpdfbox-java.
Preparing to unpack .../49-libpdfbox-java_1%3a1.8.16-2_all.deb ...
Unpacking libpdfbox-java (1:1.8.16-2) ...
Selecting previously unselected package texlive-pictures.
Preparing to unpack .../50-texlive-pictures_2021.20220204-1_all.deb ...
Unpacking texlive-pictures (2021.20220204-1) ...
Selecting previously unselected package texlive-latex-extra.
Preparing to unpack .../51-texlive-latex-extra_2021.20220204-1_all.deb ...
Unpacking texlive-latex-extra (2021.20220204-1) ...
Selecting previously unselected package texlive-plain-generic.
Preparing to unpack .../52-texlive-plain-generic_2021.20220204-1_all.deb ...
Unpacking texlive-plain-generic (2021.20220204-1) ...
Selecting previously unselected package tipa.
Preparing to unpack .../53-tipa_2%3a1.3-21_all.deb ...
Unpacking tipa (2:1.3-21) ...
Selecting previously unselected package texlive-xetex.
Preparing to unpack .../54-texlive-xetex_2021.20220204-1_all.deb ...
Unpacking texlive-xetex (2021.20220204-1) ...
Setting up fonts-lato (2.0-2.1) ...
Setting up fonts-noto-mono (20201225-1build1) ...
Setting up libwoff1:amd64 (1.0.2-1build4) ...
Setting up libtexlua53:amd64 (2021.20210626.59705-1ubuntu0.1) ...
Setting up libijs-0.35:amd64 (0.35-15build2) ...
Setting up libtexluajit2:amd64 (2021.20210626.59705-1ubuntu0.1) ...
Setting up libfontbox-java (1:1.8.16-2) ...
Setting up rubygems-integration (1.18) ...
Setting up libzip-0-13:amd64 (0.13.72+dfsg.1-1.1) ...
Setting up fonts-urw-base35 (20200910-1) ...
Setting up poppler-data (0.4.11-1) ...
Setting up tex-common (6.17) ...
update-language: texlive-base not installed and configured, doing nothing!
Setting up libfontenc1:amd64 (1:1.1.4-1build3) ...
Setting up libjbig2dec0:amd64 (0.19-3build2) ...
Setting up libteckit0:amd64 (2.5.11+ds1-1) ...

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Setting up libapache-pom-java (18-1) ...
Setting up ruby-net-telnet (0.1.1-2) ...
Setting up xfonts-encodings (1:1.0.5-0ubuntu2) ...
Setting up t1utils (1.41-4build2) ...
Setting up libidn12:amd64 (1.38-4ubuntu1) ...
Setting up fonts-texgyre (20180621-3.1) ...
Setting up libkpathsea6:amd64 (2021.20210626.59705-1ubuntu0.1) ...
Setting up ruby-webrick (1.7.0-3) ...
Setting up fonts-lmodern (2.004.5-6.1) ...
Setting up fonts-droid-fallback (1:6.0.1r16-1.1build1) ...
Setting up ruby-xmlrpc (0.3.2-1ubuntu0.1) ...
Setting up libsyntax2:amd64 (2021.20210626.59705-1ubuntu0.1) ...
Setting up libgs9-common (9.55.0~dfsg1-0ubuntu5.4) ...
Setting up teckit (2.5.11+ds1-1) ...
Setting up libpdfbox-java (1:1.8.16-2) ...
Setting up libgs9:amd64 (9.55.0~dfsg1-0ubuntu5.4) ...
Setting up preview-latex-style (12.2-1ubuntu1) ...
Setting up libcommons-parent-java (43-1) ...
Setting up dvisvgm (2.13.1-1) ...
Setting up libcommons-logging-java (1.2-2) ...
Setting up xfonts-utils (1:7.7+6build2) ...
Setting up libptexenc1:amd64 (2021.20210626.59705-1ubuntu0.1) ...
Setting up texlive-binaries (2021.20210626.59705-1ubuntu0.1) ...
update-alternatives: using /usr/bin/xdvi-xaw to provide /usr/bin/xdvi.bin
(xdvi.bin) in auto mode
update-alternatives: using /usr/bin/bibtex.original to provide /usr/bin/bibtex
(bibtex) in auto mode
Setting up lmodern (2.004.5-6.1) ...
Setting up texlive-base (2021.20220204-1) ...
/usr/bin/ucfr
/usr/bin/ucfr
/usr/bin/ucfr
/usr/bin/ucfr
mktexlsr: Updating /var/lib/texmf/ls-R-TEXLIVEDIST...
mktexlsr: Updating /var/lib/texmf/ls-R-TEXMFMAIN...
mktexlsr: Updating /var/lib/texmf/ls-R...
mktexlsr: Done.
tl-paper: setting paper size for dvips to a4:
/var/lib/texmf/dvips/config/config-paper.ps
tl-paper: setting paper size for dvipdfmx to a4:
/var/lib/texmf/dvipdfmx/dvipdfmx-paper.cfg
tl-paper: setting paper size for xdvi to a4: /var/lib/texmf/xdvi/XDvi-paper
tl-paper: setting paper size for pdftex to a4: /var/lib/texmf/tex/generic/tex-
ini-files/pdftexconfig.tex
Setting up tex-gyre (20180621-3.1) ...
Setting up texlive-plain-generic (2021.20220204-1) ...
Setting up texlive-latex-base (2021.20220204-1) ...
Setting up texlive-latex-recommended (2021.20220204-1) ...

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Setting up texlive-pictures (2021.20220204-1) ...
Setting up texlive-fonts-recommended (2021.20220204-1) ...
Setting up tipa (2:1.3-21) ...
Setting up texlive (2021.20220204-1) ...
Setting up texlive-latex-extra (2021.20220204-1) ...
Setting up texlive-xetex (2021.20220204-1) ...
Setting up rake (13.0.6-2) ...
Setting up libruby3.0:amd64 (3.0.2-7ubuntu2.4) ...
Setting up ruby3.0 (3.0.2-7ubuntu2.4) ...
Setting up ruby (1:3.0~exp1) ...
Setting up ruby-rubygems (3.3.5-2) ...
Processing triggers for man-db (2.10.2-1) ...
Processing triggers for fontconfig (2.13.1-4.2ubuntu5) ...
Processing triggers for libc-bin (2.35-0ubuntu3.1) ...
/sbin/ldconfig.real: /usr/local/lib/libtbbbind_2_5.so.3 is not a symbolic link

/sbin/ldconfig.real: /usr/local/lib/libtbb.so.12 is not a symbolic link

/sbin/ldconfig.real: /usr/local/lib/libtbbbind.so.3 is not a symbolic link

/sbin/ldconfig.real: /usr/local/lib/libtbbmalloc.so.2 is not a symbolic link

/sbin/ldconfig.real: /usr/local/lib/libtbbbind_2_0.so.3 is not a symbolic link

/sbin/ldconfig.real: /usr/local/lib/libtbbmalloc_proxy.so.2 is not a symbolic
link

Processing triggers for tex-common (6.17) ...
Running updmap-sys. This may take some time... done.
Running mktexlsr /var/lib/texmf ... done.
Building format(s) --all.
    This may take some time...

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[ ]: !jupyter nbconvert --to PDF "/content/drive/MyDrive/Colab Notebooks/Introdução_
    ↪à Aprendizagem Profunda/data/
    ↪(first_name_by_gender)char_rnn_classification_tutorial.ipynb"

```