EDA

March 31, 2023

[1]:
```
import matplotlib
import matplotlib.pyplot as plt
import numpy as np
import pandas as pd
import seaborn as sns
import statsmodels.api as sm

%matplotlib inline
```

[2]:
```
df_in = pd.read_csv('Austin_Animal_Center_Intakes.csv')
df_in.head()
```

[2]:

	Animal ID	Name	DateTime	MonthYear	Found Location	Intake Type	Intake Condition	Animal Type	Sex upon Intake	Age upon Intake	Breed	Color
0	A665644	NaN	10/21/2013 07:59:00 AM	October 2013	Austin (TX)	Stray	Sick	Cat	Intact Female	4 weeks	Domestic Shorthair Mix	Calico
1	A665739	*Alana	10/22/2013 11:11:00 AM	October 2013	Austin (TX)	Stray	Normal	Cat	Intact Female	1 month	Domestic Medium Hair Mix	Black
2	A665763	NaN	10/22/2013 03:10:00 PM	October 2013	E Riverside Dr/Royal Crest Dr in Austin (TX)	Stray	Normal	Dog	Intact Male	4 months	Cairn Terrier Mix	Tan/White
3	A379998	Disciple	10/23/2013 11:42:00 AM	October 2013	51St And Grover in Austin (TX)	Stray	Normal	Dog	Intact Male	10 years		
4	A634503	Otter	10/01/2013 02:49:00 PM	October 2013	Manor (TX)	Owner Surrender	Normal	Dog	Spayed Female	2 years		

```
3                  Pit Bull      Black
4       Norfolk Terrier Mix        Tan
```

1 Preparing the data

[3]:
```
df_out = pd.read_csv('Austin_Animal_Center_Outcomes.csv')
df_out.head()
```

[3]:
```
  Animal ID   Name              DateTime MonthYear Date of Birth  \
0   A794011  Chunk  05/08/2019 06:20:00 PM  May 2019    05/02/2017
1   A776359  Gizmo  07/18/2018 04:02:00 PM  Jul 2018    07/12/2017
2   A821648    NaN  08/16/2020 11:38:00 AM  Aug 2020    08/16/2019
3   A720371  Moose  02/13/2016 05:59:00 PM  Feb 2016    10/08/2015
4   A674754    NaN  03/18/2014 11:47:00 AM  Mar 2014    03/12/2014

  Outcome Type Outcome Subtype Animal Type Sex upon Outcome Age upon Outcome  \
0    Rto-Adopt             NaN         Cat    Neutered Male          2 years
1     Adoption             NaN         Dog    Neutered Male           1 year
2   Euthanasia             NaN       Other          Unknown           1 year
3     Adoption             NaN         Dog    Neutered Male         4 months
4     Transfer         Partner         Cat      Intact Male           6 days

                             Breed              Color
0             Domestic Shorthair Mix  Brown Tabby/White
1            Chihuahua Shorthair Mix        White/Brown
2                           Raccoon               Gray
3  Anatol Shepherd/Labrador Retriever               Buff
4             Domestic Shorthair Mix       Orange Tabby
```

[4]:
```
df_out = df_out.convert_dtypes(infer_objects=True)
df_out['DateTime'] = pd.to_datetime(df_out['DateTime'])
df_out['Date of Birth'] = pd.to_datetime(df_out['Date of Birth'])
df_out.info()
```

```
<class 'pandas.core.frame.DataFrame'>
RangeIndex: 149511 entries, 0 to 149510
Data columns (total 12 columns):
 #   Column            Non-Null Count   Dtype
---  ------            --------------   -----
 0   Animal ID         149511 non-null  string
 1   Name              106260 non-null  string
 2   DateTime          149511 non-null  datetime64[ns]
 3   MonthYear         149511 non-null  string
 4   Date of Birth     149511 non-null  datetime64[ns]
 5   Outcome Type      149485 non-null  string
 6   Outcome Subtype   68443 non-null   string
```

```
 7   Animal Type       149511 non-null  string
 8   Sex upon Outcome  149509 non-null  string
 9   Age upon Outcome  149465 non-null  string
 10  Breed             149511 non-null  string
 11  Color             149511 non-null  string
dtypes: datetime64[ns](2), string(10)
memory usage: 13.7 MB
```

1.1 Colors

[5]:
```
from math import pi

# colors.csv was compiled from these wikipedia articles
# https://en.wikipedia.org/wiki/List_of_colors:_A-F
# https://en.wikipedia.org/wiki/List_of_colors:_G%E2%80%93M
# https://en.wikipedia.org/wiki/List_of_colors:_N%E2%80%93Z
# Then the "-" character was replaced with "0"
df_colors = pd.read_csv('colors.csv')
df_colors = df_colors.convert_dtypes(infer_objects=True)
df_colors['Name'] = df_colors['Name'].str.lower()
df_colors['Red (RGB)'] = pd.to_numeric(df_colors['Red (RGB)'].str.replace('%',␣
 ↪'')).div(100)
df_colors['Green (RGB)'] = pd.to_numeric(df_colors['Green (RGB)'].str.
 ↪replace('%', '')).div(100)
df_colors['Blue (RGB)'] = pd.to_numeric(df_colors['Blue (RGB)'].str.
 ↪replace('%', '')).div(100)
df_colors['Hue (HSL/HSV)'] = pd.to_numeric(df_colors['Hue (HSL/HSV)'].str.
 ↪replace('°', '')).div(360)
df_colors['Satur. (HSL)'] = pd.to_numeric(df_colors['Satur. (HSL)'].str.
 ↪replace('%', '')).div(100)
df_colors['Light (HSL)'] = pd.to_numeric(df_colors['Light (HSL)'].str.
 ↪replace('%', '')).div(100)
df_colors['Satur. (HSV)'] = pd.to_numeric(df_colors['Satur. (HSV)'].str.
 ↪replace('%', '')).div(100)
df_colors['Value (HSV)'] = pd.to_numeric(df_colors['Value (HSV)'].str.
 ↪replace('%', '')).div(100)
df_colors.head()
```

[5]:

	Name	Hex (RGB)	Red (RGB)	Green (RGB)	Blue (RGB)	\
0	absolute zero	#0048BA	0.00	0.28	0.73	
1	acid green	#B0BF1A	0.69	0.75	0.10	
2	aero	#7CB9E8	0.49	0.73	0.91	
3	african violet	#B284BE	0.70	0.52	0.75	
4	air superiority blue	#72A0C1	0.45	0.63	0.76	

	Hue (HSL/HSV)	Satur. (HSL)	Light (HSL)	Satur. (HSV)	Value (HSV)	\
0	0.602778	1.00	0.37	1.00	0.73	

```
1       0.180556          0.76          0.43          0.76          0.43
2       0.572222          0.70          0.70          0.47          0.91
3       0.800000          0.31          0.63          0.31          0.75
4       0.569444          0.39          0.60          0.41          0.76

                 Source
0               Crayola
1      Art Paints YG07S
2        Maerz and Paul
3               Pantone
4  Federal Standard 595
```

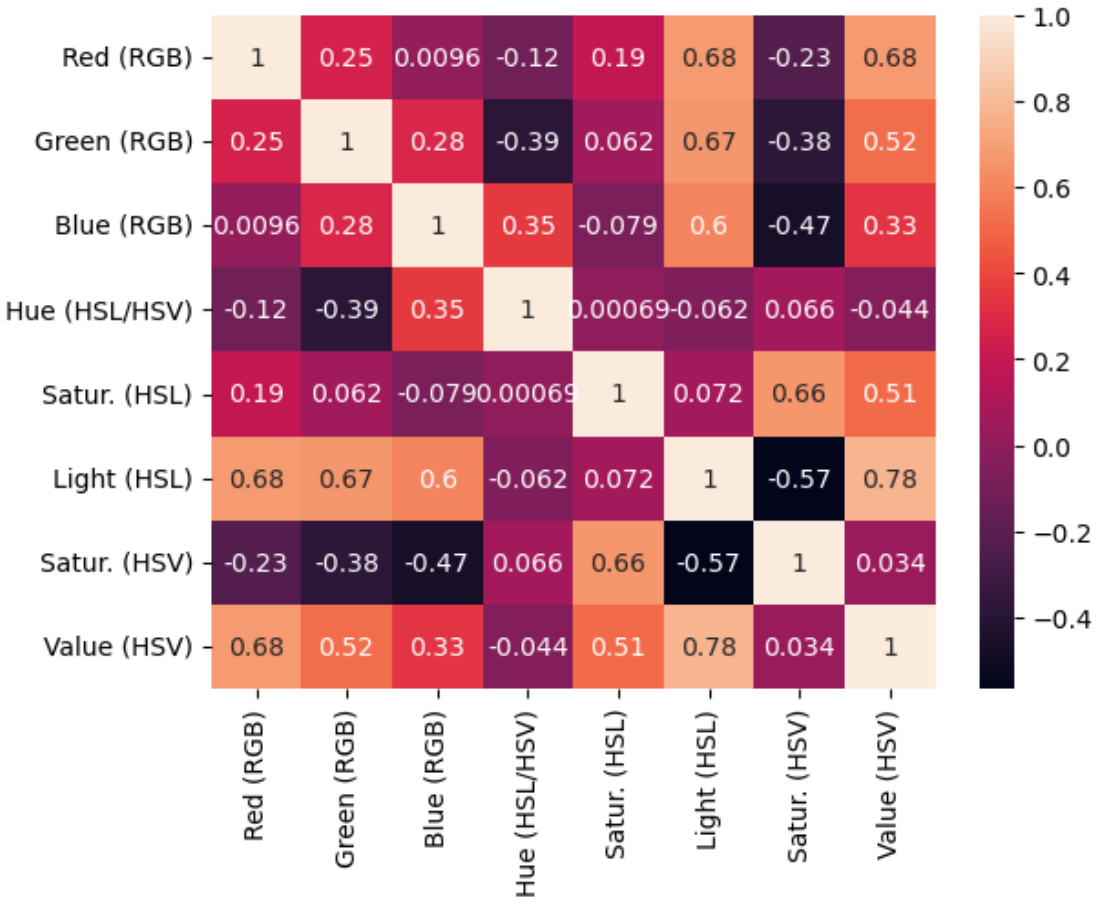
Since we will look for correlations with the color variables for the animals, we want to account for the fact that those color variables are drawn from this dataset, and so there could be a sampling bias in how the colors are interpreted.

Here, it looks like there is a weak correlation between red and green and between green and blue, but red and blue are mostly unrelated.

[6]:
```
sns.heatmap(data=df_colors.corr(), annot=True)
```

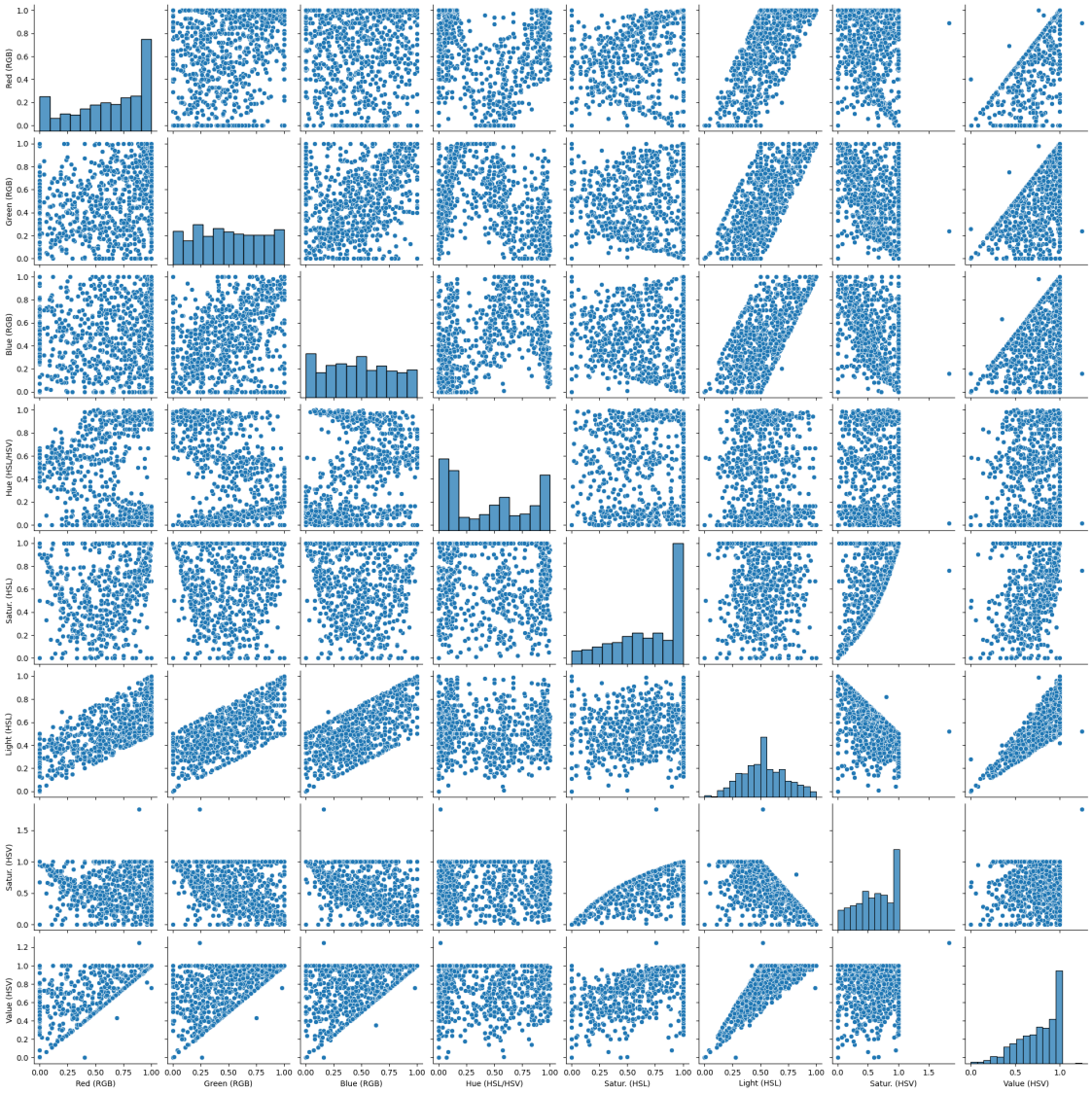
```
/tmp/ipykernel_29164/3282312412.py:1: FutureWarning: The default value of
numeric_only in DataFrame.corr is deprecated. In a future version, it will
default to False. Select only valid columns or specify the value of numeric_only
to silence this warning.
  sns.heatmap(data=df_colors.corr(), annot=True)
```

[6]: <AxesSubplot:>



[7]:
```
sns.pairplot(df_colors)
```

[7]: <seaborn.axisgrid.PairGrid at 0x7f64dbda84c0>



Colors are looked up by splitting the query color name by words, then looking for the first exact match with one of the words, but if there are none then it looks for any color with a name containing any of the query words.

For example, consider looking up colors with the word "brown" in their name. Notice that none of the colors are literally "brown" though they all have "brown" in the name.

[8]:
```
df_colors.loc[df_colors.Name.str.contains("brown")]
```

[8]:

	Name	Hex (RGB)	Red (RGB)	Green (RGB)	Blue (RGB)	\
47	bistre brown	#967117	0.59	0.44	0.09	
79	brown sugar	#AF6E4D	0.69	0.43	0.30	
84	burnished brown	#A17A74	0.63	0.48	0.45	
157	coyote brown	#81613C	0.51	0.38	0.24	

```
168                 dark brown   #654321       0.40         0.26         0.13
209            drab dark brown   #4A412A       0.29         0.25         0.16
271               golden brown   #996515       0.60         0.40         0.08
596  pullman brown (ups brown)   #644117       0.39         0.25         0.09
661                 rosy brown   #BC8F8F       0.74         0.56         0.56
677               saddle brown   #8B4513       0.55         0.27         0.07
688                sandy brown   #F4A460       0.96         0.64         0.38
701                 seal brown   #59260B       0.20         0.08         0.08
765                sweet brown   #A83731       0.66         0.22         0.19
799               tuscan brown   #6F4E37       0.44         0.31         0.22
821             van dyke brown   #664228       0.40         0.26         0.16
860                 wood brown   #C19A6B       0.76         0.60         0.42

     Hue (HSL/HSV)  Satur. (HSL)  Light (HSL)  Satur. (HSV)  Value (HSV)  \
47        0.119444          0.73         0.34          0.85         0.59
79        0.055556          0.39         0.49          0.56         0.69
84        0.022222          0.19         0.54          0.28         0.63
157       0.088889          0.37         0.37          0.52         0.51
168       0.083333          0.51         0.26          0.67         0.40
209       0.119444          0.28         0.23          0.43         0.29
271       0.100000          0.76         0.34          0.86         0.60
596       0.091667          0.63         0.24          0.77         0.39
661       0.000000          0.25         0.65          0.24         0.74
677       0.069444          0.76         0.31          0.86         0.55
688       0.077778          0.87         0.67          0.61         0.96
701       0.000000          0.43         0.14          0.60         0.20
765       0.008333          0.55         0.43          0.71         0.66
799       0.069444          0.34         0.33          0.50         0.44
821       0.069444          0.44         0.28          0.60         0.00
860       0.091667          0.41         0.59          0.45         0.76

          Source
47       ISCC-NBS
79        Crayola
84        Crayola
157  colorcode.is
168       X11/Web
209       Pantone
271          <NA>
596          <NA>
661          <NA>
677          <NA>
688          <NA>
701          <NA>
765          <NA>
799          <NA>
821          <NA>
```

```
860          <NA>
```

[9]:
```python
def colorInfo(color):
    color = color.lower()
    words = [color] if color.count(' ') == 0 else [color] + color.split(' ')
    for word in words:
        try:
            items = df_colors.loc[df_colors.Name == word]
            if len(items) > 0:
                return items
        except:
            continue

    for word in words:
        try:
            items = df_colors.loc[df_colors.Name.str.contains(word)]
            if len(items) > 0:
                return items
        except:
            continue

    return None

# def rgb(color):
#     info = colorInfo(color)
#     if info is None: return (None, None, None)
#     r = info['Red (RGB)'].values[0]
#     g = info['Green (RGB)'].values[0]
#     b = info['Blue (RGB)'].values[0]
#     return (r, g, b)

def rgbhsv(color):
    info = colorInfo(color)
    if info is None: return (None, None, None, None, None, None)
    r = info['Red (RGB)'].values[0]
    g = info['Green (RGB)'].values[0]
    b = info['Blue (RGB)'].values[0]
    h = info['Hue (HSL/HSV)'].values[0]
    s = info['Satur. (HSV)'].values[0]
    v = info['Value (HSV)'].values[0]
    return (r, g, b, h, s, v)

rgbhsv('brown')
```

[9]:
```
(0.59, 0.44, 0.09, 0.11944444444444445, 0.85, 0.59)
```

[10]:
```
def flatten(x):
    res = []
    for y in x:
        res.extend(y)
    return res

flatten([(1, 2), ('x', 'y')])
```

[10]:
```
[1, 2, 'x', 'y']
```

[11]:
```
df_out['Colors (count)'] = df_out.Color.str.count('/') + 1
df_out = df_out.assign(**{
    'Color 0': [colors[0] for colors in df_out.Color.str.split('/')],
    'Color 1': [colors[1] if len(colors) > 1 else None for colors in df_out.
 ↪Color.str.split('/')]
}).convert_dtypes(infer_objects=True)
df_out.info()
df_out.head()
```

```
<class 'pandas.core.frame.DataFrame'>
RangeIndex: 149511 entries, 0 to 149510
Data columns (total 15 columns):
 #   Column            Non-Null Count   Dtype
---  ------            --------------   -----
 0   Animal ID         149511 non-null  string
 1   Name              106260 non-null  string
 2   DateTime          149511 non-null  datetime64[ns]
 3   MonthYear         149511 non-null  string
 4   Date of Birth     149511 non-null  datetime64[ns]
 5   Outcome Type      149485 non-null  string
 6   Outcome Subtype   68443 non-null   string
 7   Animal Type       149511 non-null  string
 8   Sex upon Outcome  149509 non-null  string
 9   Age upon Outcome  149465 non-null  string
 10  Breed             149511 non-null  string
 11  Color             149511 non-null  string
 12  Colors (count)    149511 non-null  Int64
 13  Color 0           149511 non-null  string
 14  Color 1           79869 non-null   string
dtypes: Int64(1), datetime64[ns](2), string(12)
memory usage: 17.3 MB
```

[11]:

	Animal ID	Name	DateTime	MonthYear	Date of Birth	Outcome Type	\
0	A794011	Chunk	2019-05-08 18:20:00	May 2019	2017-05-02	Rto-Adopt	
1	A776359	Gizmo	2018-07-18 16:02:00	Jul 2018	2017-07-12	Adoption	
2	A821648	<NA>	2020-08-16 11:38:00	Aug 2020	2019-08-16	Euthanasia	
3	A720371	Moose	2016-02-13 17:59:00	Feb 2016	2015-10-08	Adoption	

```
4   A674754   <NA> 2014-03-18 11:47:00  Mar 2014    2014-03-12     Transfer

  Outcome Subtype Animal Type Sex upon Outcome Age upon Outcome  \
0            <NA>         Cat    Neutered Male          2 years
1            <NA>         Dog    Neutered Male           1 year
2            <NA>       Other          Unknown           1 year
3            <NA>         Dog    Neutered Male         4 months
4         Partner         Cat      Intact Male           6 days

                              Breed              Color  Colors (count)  \
0             Domestic Shorthair Mix  Brown Tabby/White               2
1            Chihuahua Shorthair Mix        White/Brown               2
2                           Raccoon               Gray               1
3  Anatol Shepherd/Labrador Retriever               Buff               1
4             Domestic Shorthair Mix       Orange Tabby               1

        Color 0 Color 1
0   Brown Tabby   White
1         White   Brown
2          Gray    <NA>
3          Buff    <NA>
4  Orange Tabby    <NA>
```

This cell takes a few minutes to complete

[12]:
```
color_vars = 'RGBHSV'

for color_index in ['0', '1']:
    colors = df_out[f'Color {color_index}']
    colors_isna = colors.isna()
    colors_RGBHSV = [rgbhsv(color) if not colors_isna[i] else (None, None,␣
 ↪None, None, None, None) for i,color in enumerate(colors)]
    color_columns = []
    for color_var_i in range(len(color_vars)):
        color_var = color_vars[color_var_i]
        color_column = f'Color {color_index} {color_var}'
        color_columns.append(color_column)
        df_out = df_out.assign(**{
            color_column: pd.Series(np.zeros_like(df_out.index)).
 ↪astype(dtype=float)
        })
    df_out[color_columns] = colors_RGBHSV

df_out
```

[12]:
```
       Animal ID        Name            DateTime MonthYear Date of Birth  \
0        A794011       Chunk 2019-05-08 18:20:00  May 2019    2017-05-02
```

```
1         A776359       Gizmo 2018-07-18 16:02:00  Jul 2018    2017-07-12
2         A821648        <NA> 2020-08-16 11:38:00  Aug 2020    2019-08-16
3         A720371       Moose 2016-02-13 17:59:00  Feb 2016    2015-10-08
4         A674754        <NA> 2014-03-18 11:47:00  Mar 2014    2014-03-12
…           …          …                  …        …           …
149506    A859974  *Lady Gaga 2022-08-16 11:42:00  Aug 2022    2012-06-21
149507    A856973      *Suede 2022-06-11 15:39:00  Jun 2022    2021-05-10
149508    A852036       Queen 2022-03-17 17:22:00  Mar 2022    2021-12-08
149509    A852775     A852775 2022-05-18 14:13:00  May 2022    2022-01-31
149510    A854626     A854626 2022-05-03 16:10:00  May 2022    2022-02-27

        Outcome Type Outcome Subtype Animal Type Sex upon Outcome  \
0         Rto-Adopt            <NA>         Cat    Neutered Male
1          Adoption            <NA>         Dog    Neutered Male
2         Euthanasia            <NA>       Other          Unknown
3          Adoption            <NA>         Dog    Neutered Male
4          Transfer         Partner         Cat      Intact Male
…             …             …          …             …
149506     Adoption            <NA>         Cat    Spayed Female
149507     Adoption            <NA>         Cat    Spayed Female
149508     Adoption            <NA>         Dog    Spayed Female
149509     Adoption          Foster         Cat    Spayed Female
149510     Adoption          Foster         Cat    Neutered Male

        Age upon Outcome  … Color 0 B Color 0 H  Color 0 S Color 0 V  \
0                2 years  …      0.09  0.119444       0.85      0.59
1                 1 year  …      1.00  0.000000       0.00      1.00
2                 1 year  …      0.71  0.375000       0.06      0.75
3              4 months  …      0.50  0.091667       0.50      1.00
4                6 days  …      0.00  0.083333       1.00      1.00
…                  …  …       …        …         …       …
149506         10 years  …      1.00  0.000000       0.00      1.00
149507          1 year  …      1.00  0.666667       1.00      1.00
149508         3 months  …      0.09  0.119444       0.85      0.59
149509         3 months  …       NaN       NaN        NaN       NaN
149510         2 months  …      0.00  0.083333       1.00      1.00

        Color 1 R  Color 1 G  Color 1 B  Color 1 H  Color 1 S  Color 1 V
0            1.00       1.00       1.00   0.000000       0.00       1.00
1            0.59       0.44       0.09   0.119444       0.85       0.59
2             NaN        NaN        NaN        NaN        NaN        NaN
3             NaN        NaN        NaN        NaN        NaN        NaN
4             NaN        NaN        NaN        NaN        NaN        NaN
…           …          …          …          …          …          …
149506        NaN        NaN        NaN        NaN        NaN        NaN
149507        NaN        NaN        NaN        NaN        NaN        NaN
149508       0.00       0.00       0.00   0.000000       0.00       0.00
```

```
149509       NaN        NaN        NaN        NaN        NaN        NaN
149510       NaN        NaN        NaN        NaN        NaN        NaN

[149511 rows x 27 columns]
```

1.2 Age

The "Age upon Outcome (years)" column is made here

[13]:
```
def age_years(age):
    try:
        [number_str, unit] = age.split(' ')
        number = float(number_str)
        if unit in ['years', 'year']:
            return number
        elif unit in ['months', 'month']:
            return number / 12
        elif unit in ['weeks', 'week']:
            return number / 52
        elif unit in ['days', 'day']:
            return number / 365
    except: pass
    return None

df_out['Age upon Outcome (years)'] = [age_years(age) for age in df_out['Age␣
 ↪upon Outcome']]
df_out.head()
```

[13]:
```
  Animal ID   Name            DateTime MonthYear Date of Birth Outcome Type  \
0   A794011  Chunk 2019-05-08 18:20:00  May 2019    2017-05-02    Rto-Adopt
1   A776359  Gizmo 2018-07-18 16:02:00  Jul 2018    2017-07-12     Adoption
2   A821648   <NA> 2020-08-16 11:38:00  Aug 2020    2019-08-16   Euthanasia
3   A720371  Moose 2016-02-13 17:59:00  Feb 2016    2015-10-08     Adoption
4   A674754   <NA> 2014-03-18 11:47:00  Mar 2014    2014-03-12     Transfer

  Outcome Subtype Animal Type Sex upon Outcome Age upon Outcome  …  \
0            <NA>         Cat    Neutered Male          2 years  …
1            <NA>         Dog    Neutered Male           1 year  …
2            <NA>       Other          Unknown           1 year  …
3            <NA>         Dog    Neutered Male         4 months  …
4         Partner         Cat      Intact Male           6 days  …

  Color 0 H Color 0 S  Color 0 V Color 1 R Color 1 G  Color 1 B  Color 1 H  \
0  0.119444      0.85       0.59      1.00      1.00       1.00   0.000000
1  0.000000      0.00       1.00      0.59      0.44       0.09   0.119444
2  0.375000      0.06       0.75       NaN       NaN        NaN        NaN
3  0.091667      0.50       1.00       NaN       NaN        NaN        NaN
```

```
4  0.083333      1.00       1.00       NaN       NaN        NaN        NaN

   Color 1 S  Color 1 V  Age upon Outcome (years)
0       0.00       1.00                  2.000000
1       0.85       0.59                  1.000000
2        NaN        NaN                  1.000000
3        NaN        NaN                  0.333333
4        NaN        NaN                  0.016438

[5 rows x 28 columns]
```

1.3 Sex

Male or female are classified in two columns since some animals are of unknown sex

[14]:
```
# sex and neuter/spay columns

sex_male = df_out['Sex upon Outcome'].str.endswith(' Male')
sex_female = df_out['Sex upon Outcome'].str.endswith(' Female')
neutered_or_spayed = df_out['Sex upon Outcome'].str.startswith('Neutered') |␣
 ↪df_out['Sex upon Outcome'].str.startswith('Spayed')

df_out['Male'] = sex_male
df_out['Female'] = sex_female
df_out['NeuteredOrSpayed'] = neutered_or_spayed
df_out = df_out.convert_dtypes(convert_boolean=True)
df_out.info()
df_out.head(10)
```

```
<class 'pandas.core.frame.DataFrame'>
RangeIndex: 149511 entries, 0 to 149510
Data columns (total 31 columns):
 #   Column                   Non-Null Count   Dtype
---  ------                   --------------   -----
 0   Animal ID                149511 non-null  string
 1   Name                     106260 non-null  string
 2   DateTime                 149511 non-null  datetime64[ns]
 3   MonthYear                149511 non-null  string
 4   Date of Birth            149511 non-null  datetime64[ns]
 5   Outcome Type             149485 non-null  string
 6   Outcome Subtype          68443 non-null   string
 7   Animal Type              149511 non-null  string
 8   Sex upon Outcome         149509 non-null  string
 9   Age upon Outcome         149465 non-null  string
 10  Breed                    149511 non-null  string
 11  Color                    149511 non-null  string
 12  Colors (count)           149511 non-null  Int64
 13  Color 0                  149511 non-null  string
```

```
 14  Color 1                   79869 non-null   string
 15  Color 0 R                 135638 non-null  Float64
 16  Color 0 G                 135638 non-null  Float64
 17  Color 0 B                 135638 non-null  Float64
 18  Color 0 H                 135638 non-null  Float64
 19  Color 0 S                 135638 non-null  Float64
 20  Color 0 V                 135638 non-null  Float64
 21  Color 1 R                 78596 non-null   Float64
 22  Color 1 G                 78596 non-null   Float64
 23  Color 1 B                 78596 non-null   Float64
 24  Color 1 H                 78596 non-null   Float64
 25  Color 1 S                 78596 non-null   Float64
 26  Color 1 V                 78596 non-null   Float64
 27  Age upon Outcome (years)  149465 non-null  Float64
 28  Male                      149509 non-null  boolean
 29  Female                    149509 non-null  boolean
 30  NeuteredOrSpayed          149509 non-null  boolean
dtypes: Float64(13), Int64(1), boolean(3), datetime64[ns](2), string(12)
memory usage: 34.8 MB
```

[14]:

	Animal ID	Name	DateTime	MonthYear	Date of Birth
0	A794011	Chunk	2019-05-08 18:20:00	May 2019	2017-05-02
1	A776359	Gizmo	2018-07-18 16:02:00	Jul 2018	2017-07-12
2	A821648	<NA>	2020-08-16 11:38:00	Aug 2020	2019-08-16
3	A720371	Moose	2016-02-13 17:59:00	Feb 2016	2015-10-08
4	A674754	<NA>	2014-03-18 11:47:00	Mar 2014	2014-03-12
5	A659412	Princess	2020-10-05 14:37:00	Oct 2020	2013-03-24
6	A814515	Quentin	2020-05-06 07:59:00	May 2020	2018-03-01
7	A868405	*Leo	2023-03-04 13:38:00	Mar 2023	2020-11-02
8	A689724	*Donatello	2014-10-18 18:52:00	Oct 2014	2014-08-01
9	A680969	*Zeus	2014-08-05 16:59:00	Aug 2014	2014-06-03

	Outcome Type	Outcome Subtype	Animal Type	Sex upon Outcome	Age upon Outcome
0	Rto-Adopt	<NA>	Cat	Neutered Male	2 years
1	Adoption	<NA>	Dog	Neutered Male	1 year
2	Euthanasia	<NA>	Other	Unknown	1 year
3	Adoption	<NA>	Dog	Neutered Male	4 months
4	Transfer	Partner	Cat	Intact Male	6 days
5	Adoption	<NA>	Dog	Spayed Female	7 years
6	Adoption	Foster	Dog	Neutered Male	2 years
7	Adoption	<NA>	Dog	Neutered Male	2 years
8	Adoption	<NA>	Cat	Neutered Male	2 months
9	Adoption	<NA>	Cat	Neutered Male	2 months

	…	Color 1 R	Color 1 G	Color 1 B	Color 1 H	Color 1 S	Color 1 V
0	…	1.0	1.0	1.0	0.0	0.0	1.0
1	…	0.59	0.44	0.09	0.119444	0.85	0.59

```
2  …      <NA>      <NA>       <NA>      <NA>      <NA>       <NA>
3  …      <NA>      <NA>       <NA>      <NA>      <NA>       <NA>
4  …      <NA>      <NA>       <NA>      <NA>      <NA>       <NA>
5  …      <NA>      <NA>       <NA>      <NA>      <NA>       <NA>
6  …      0.59      0.44       0.09  0.119444      0.85       0.59
7  …       1.0       1.0        1.0       0.0       0.0        1.0
8  …      <NA>      <NA>       <NA>      <NA>      <NA>       <NA>
9  …       1.0       0.5        0.0  0.083333       1.0        1.0

   Age upon Outcome (years)   Male  Female  NeuteredOrSpayed
0                       2.0   True   False              True
1                       1.0   True   False              True
2                       1.0  False   False             False
3                  0.333333   True   False              True
4                  0.016438   True   False             False
5                       7.0  False    True              True
6                       2.0   True   False              True
7                       2.0   True   False              True
8                  0.166667   True   False              True
9                  0.166667   True   False              True

[10 rows x 31 columns]
```

1.4 Adopted?

[15]:
```
df_out['Adopted'] = df_out['Outcome Type'].str.find('Adopt') >= 0
```

[16]:
```
def bigCorr_bernoulli(df, independent, dependent):
    return (
        df[[independent, dependent]].groupby(independent).value_counts().div(
        df[[independent]].groupby(independent).value_counts())
    )[:,True]
```

2 Analysis by breed

2.1 Preparing the breeds dataframe

[17]:
```
breeds_counts = df_out.Breed.value_counts()
df_breeds = pd.DataFrame(index=breeds_counts.index)
df_breeds = df_breeds.assign(Breed=breeds_counts.index, Count=breeds_counts)
df_breeds
```

[17]:
```
                                                  Breed  \
Domestic Shorthair Mix                 Domestic Shorthair Mix
Domestic Shorthair                        Domestic Shorthair
Pit Bull Mix                                     Pit Bull Mix
```

```
Labrador Retriever Mix                                Labrador Retriever Mix
Chihuahua Shorthair Mix                              Chihuahua Shorthair Mix
…                                                                        …
Lovebird Mix                                                  Lovebird Mix
American Pit Bull Terrier/Pointer          American Pit Bull Terrier/Pointer
Dachshund Wirehair/Manchester Terrier  Dachshund Wirehair/Manchester Terrier
Norfolk Terrier/Border Terrier                Norfolk Terrier/Border Terrier
Pointer/English Coonhound                          Pointer/English Coonhound

                                       Count
Domestic Shorthair Mix                 33260
Domestic Shorthair                     13808
Pit Bull Mix                            9406
Labrador Retriever Mix                  7913
Chihuahua Shorthair Mix                 6689
…                                       …
Lovebird Mix                               1
American Pit Bull Terrier/Pointer          1
Dachshund Wirehair/Manchester Terrier      1
Norfolk Terrier/Border Terrier             1
Pointer/English Coonhound                  1

[2833 rows x 2 columns]
```

[18]:
```
# Add animal type to the breed
breeds_types = df_out[['Breed', 'Animal Type']].groupby('Breed').value_counts().
 ↪index
breeds = [breed_type[0] for breed_type in breeds_types]
types = [breed_type[1] for breed_type in breeds_types]
df_breeds_types = pd.DataFrame(data=types, index=breeds, columns=['Type'])
df_breeds_types = df_breeds_types.assign(Breed=breeds)
df_breeds_types = df_breeds_types.drop_duplicates('Breed')
df_breeds = df_breeds.assign(**{'Animal Type': df_breeds_types['Type']})
df_breeds = df_breeds.convert_dtypes(infer_objects=True)
df_breeds
```

[18]:
```
                                                                  Breed  \
Domestic Shorthair Mix                               Domestic Shorthair Mix
Domestic Shorthair                                       Domestic Shorthair
Pit Bull Mix                                                   Pit Bull Mix
Labrador Retriever Mix                               Labrador Retriever Mix
Chihuahua Shorthair Mix                             Chihuahua Shorthair Mix
…                                                                        …
Lovebird Mix                                                  Lovebird Mix
American Pit Bull Terrier/Pointer          American Pit Bull Terrier/Pointer
Dachshund Wirehair/Manchester Terrier  Dachshund Wirehair/Manchester Terrier
Norfolk Terrier/Border Terrier                Norfolk Terrier/Border Terrier
```

```
Pointer/English Coonhound                          Pointer/English Coonhound

                                          Count Animal Type
Domestic Shorthair Mix                    33260         Cat
Domestic Shorthair                        13808         Cat
Pit Bull Mix                               9406         Dog
Labrador Retriever Mix                     7913         Dog
Chihuahua Shorthair Mix                    6689         Dog
…                                          …          …
Lovebird Mix                                  1        Bird
American Pit Bull Terrier/Pointer             1         Dog
Dachshund Wirehair/Manchester Terrier         1         Dog
Norfolk Terrier/Border Terrier                1         Dog
Pointer/English Coonhound                     1         Dog

[2833 rows x 3 columns]
```

[19]:
```
## Adoption likelihood

df_breeds = df_breeds.assign(Adopted=bigCorr_bernoulli(df_out, 'Breed',␣
 ↪'Adopted'))
df_breeds
```

[19]:
```
                                                                Breed  \
Domestic Shorthair Mix                                Domestic Shorthair Mix
Domestic Shorthair                                        Domestic Shorthair
Pit Bull Mix                                                  Pit Bull Mix
Labrador Retriever Mix                                Labrador Retriever Mix
Chihuahua Shorthair Mix                               Chihuahua Shorthair Mix
…                                                                        …
Lovebird Mix                                                  Lovebird Mix
American Pit Bull Terrier/Pointer          American Pit Bull Terrier/Pointer
Dachshund Wirehair/Manchester Terrier  Dachshund Wirehair/Manchester Terrier
Norfolk Terrier/Border Terrier                Norfolk Terrier/Border Terrier
Pointer/English Coonhound                          Pointer/English Coonhound

                                          Count Animal Type   Adopted
Domestic Shorthair Mix                    33260         Cat  0.461425
Domestic Shorthair                        13808         Cat  0.553158
Pit Bull Mix                               9406         Dog  0.431427
Labrador Retriever Mix                     7913         Dog  0.546063
Chihuahua Shorthair Mix                    6689         Dog  0.483181
…                                          …          …       …
Lovebird Mix                                  1        Bird  1.000000
American Pit Bull Terrier/Pointer             1         Dog  1.000000
Dachshund Wirehair/Manchester Terrier         1         Dog  1.000000
Norfolk Terrier/Border Terrier                1         Dog       NaN
```

```
Pointer/English Coonhound                   1         Dog  1.000000

[2833 rows x 4 columns]
```

[20]:
```
def means(df_groups, df_individual, independent, dependent):
    df_groups[f'{dependent} (mean)'] = df_individual[[independent, dependent]].
 ↪groupby(independent).mean()
def stdDevs(df_groups, df_individual, independent, dependent):
    df_groups[f'{dependent} (std dev)'] = df_individual[[independent,␣
 ↪dependent]].groupby(independent).std()
def stats(df_groups, df_individual, independent, dependent):
    means(df_groups, df_individual, independent, dependent)
    stdDevs(df_groups, df_individual, independent, dependent)

for color_index in ['0', '1']:
    for color_feature in color_vars:
        stats(df_breeds, df_out, 'Breed', f'Color {color_index}␣
 ↪{color_feature}')

df_breeds.head()
```

[20]:

	Breed	Count	Animal Type	Adopted	\
Domestic Shorthair Mix	Domestic Shorthair Mix	33260	Cat	0.461425	
Domestic Shorthair	Domestic Shorthair	13808	Cat	0.553158	
Pit Bull Mix	Pit Bull Mix	9406	Dog	0.431427	
Labrador Retriever Mix	Labrador Retriever Mix	7913	Dog	0.546063	
Chihuahua Shorthair Mix	Chihuahua Shorthair Mix	6689	Dog	0.483181	

	Color 0 R (mean)	Color 0 R (std dev)	\
Domestic Shorthair Mix	0.439476	0.412274	
Domestic Shorthair	0.451115	0.412934	
Pit Bull Mix	0.513666	0.403283	
Labrador Retriever Mix	0.409771	0.421755	
Chihuahua Shorthair Mix	0.609789	0.370759	

	Color 0 G (mean)	Color 0 G (std dev)	\
Domestic Shorthair Mix	0.322711	0.323957	
Domestic Shorthair	0.331264	0.324532	
Pit Bull Mix	0.418784	0.381554	
Labrador Retriever Mix	0.329495	0.388036	
Chihuahua Shorthair Mix	0.493648	0.361854	

	Color 0 B (mean)	Color 0 B (std dev)	…	\
Domestic Shorthair Mix	0.286948	0.413041	…	
Domestic Shorthair	0.293482	0.413847	…	
Pit Bull Mix	0.476534	0.439715	…	
Labrador Retriever Mix	0.181561	0.323025	…	

```
Chihuahua Shorthair Mix          0.356013             0.369441  …

                         Color 1 G (mean)  Color 1 G (std dev)  \
Domestic Shorthair Mix           0.877082             0.302012
Domestic Shorthair                0.86943             0.310584
Pit Bull Mix                     0.842194             0.318559
Labrador Retriever Mix           0.858574             0.298292
Chihuahua Shorthair Mix          0.737161             0.330531

                         Color 1 B (mean)  Color 1 B (std dev)  \
Domestic Shorthair Mix           0.879391             0.315389
Domestic Shorthair               0.869237             0.327447
Pit Bull Mix                     0.830459             0.350301
Labrador Retriever Mix            0.82045             0.350653
Chihuahua Shorthair Mix           0.64574             0.398973

                         Color 1 H (mean)  Color 1 H (std dev)  \
Domestic Shorthair Mix           0.028722             0.115326
Domestic Shorthair               0.027946             0.112799
Pit Bull Mix                     0.034014             0.115363
Labrador Retriever Mix           0.018031             0.055216
Chihuahua Shorthair Mix          0.038664             0.059027

                         Color 1 S (mean)  Color 1 S (std dev)  \
Domestic Shorthair Mix           0.080351             0.259559
Domestic Shorthair                0.08027             0.259781
Pit Bull Mix                     0.124423             0.298265
Labrador Retriever Mix           0.097087             0.249907
Chihuahua Shorthair Mix          0.221868             0.320446

                         Color 1 V (mean)  Color 1 V (std dev)
Domestic Shorthair Mix           0.919515             0.250093
Domestic Shorthair               0.910416             0.263834
Pit Bull Mix                     0.893498             0.257412
Labrador Retriever Mix           0.885889             0.270776
Chihuahua Shorthair Mix          0.797511             0.301396

[5 rows x 28 columns]
```

[21]:
```
# sns.pairplot(data=df_breeds)
```

[22]:
```
df_breeds_info = pd.read_csv('dog breeds_enriched_20210503.csv').
  ↪convert_dtypes(infer_objects=True)
df_breeds_info.info()
df_breeds_info.head()
```

```
<class 'pandas.core.frame.DataFrame'>
```

```
RangeIndex: 195 entries, 0 to 194
Data columns (total 14 columns):
 #   Column              Non-Null Count  Dtype
---  ------              --------------  -----
 0   Breed               195 non-null    string
 1   Breed Group AKC     195 non-null    string
 2   Breed Group CKC     195 non-null    string
 3   Breed Group UKC     195 non-null    string
 4   CKC Subgroup        194 non-null    string
 5   height_low_inches   195 non-null    Float64
 6   height_high_inches  195 non-null    Float64
 7   average height      195 non-null    Float64
 8   weight_low_lbs      195 non-null    Float64
 9   weight_high_lbs     195 non-null    Int64
 10  average weight      195 non-null    Float64
 11  Lifespan Low        194 non-null    Int64
 12  Lifespan High       194 non-null    Int64
 13  average lifespan    195 non-null    Float64
dtypes: Float64(6), Int64(3), string(5)
memory usage: 23.2 KB
```

[22]:

	Breed	Breed Group AKC	Breed Group CKC	Breed Group UKC	CKC Subgroup	height_low_inches	height_high_inches	average height	weight_low_lbs	weight_high_lbs
0	Affenpinscher	Toy Group	Group 5: Pinschers and Schnauzers	Companion Dog	5-B: Small Pinschers and Schnauzers	9.0	12.0	10.5	8.0	12
1	Afghan Hound	Hound Group	Group 8: Sighthound Breeds	Sighthound & Pariah	8-B: Long Haired Sighthounds	25.0	27.0	26.0	50.0	60
2	Aidi	Not Recognized	Not Recognized	Guardian Dog	Not Recognized	20.0	24.5	22.25	50.0	55
3	Airedale Terrier	Terrier Group	Group 6: Terrier Breeds	Terrier	6-A: Large Terriers	22.0	24.0	23.0	45.0	45
4	Akbash Dog	Not Recognized	Group 9: Large Guardian Pastoral/Mountain Dogs	Guardian Dog	None	27.0				

```
4                 34.0             30.5             75.0                 140

   average weight  Lifespan Low  Lifespan High  average lifespan
0            10.0            12             15              13.5
1            55.0            12             15              13.5
2            52.5            12             13              12.5
3            45.0            11             14              12.5
4           107.5             9             11              10.0
```

[23]:

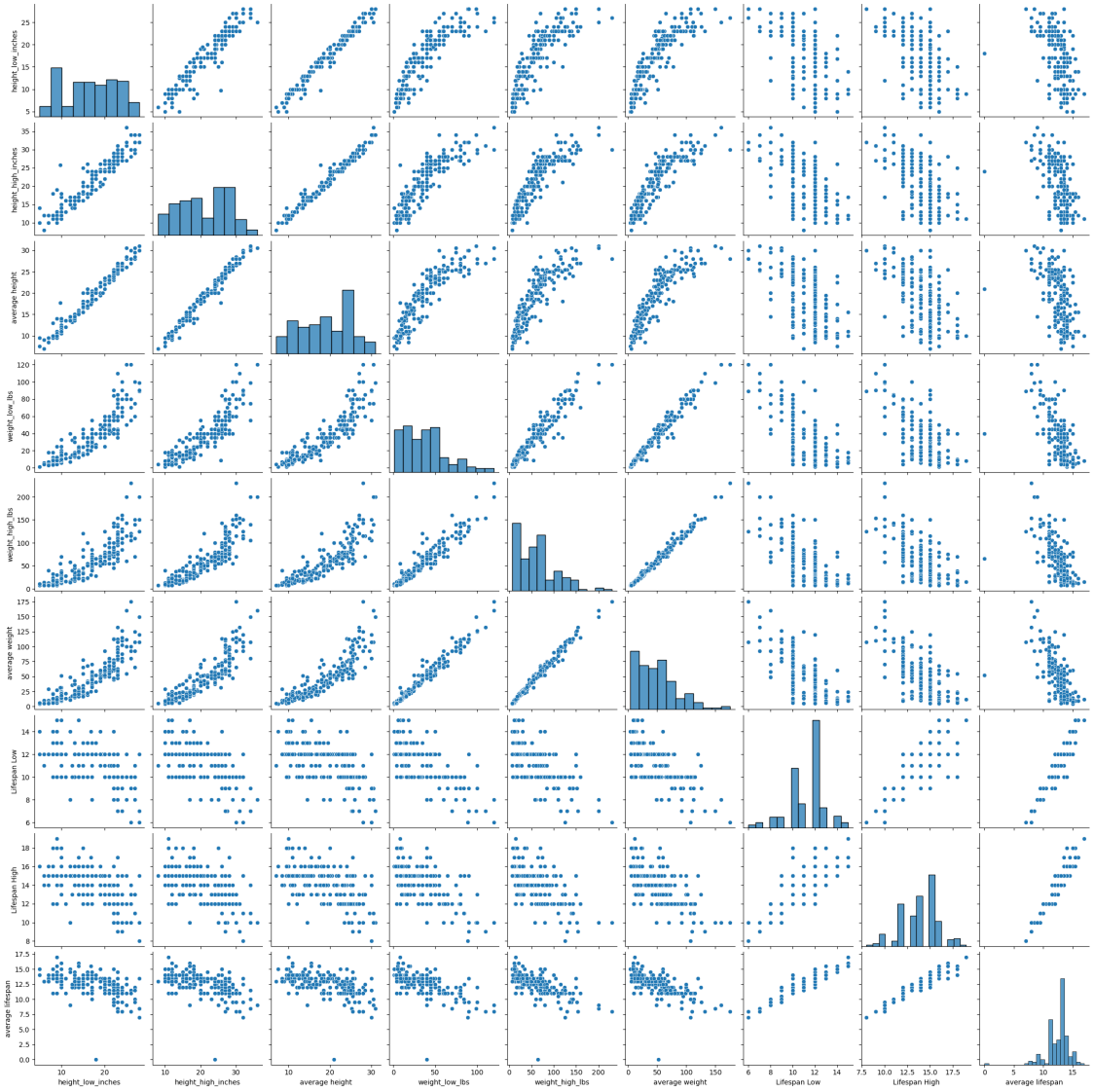
```
sns.pairplot(data=df_breeds_info)
```

```
/home/isaac/miniconda3/envs/cse3380/lib/python3.10/site-
packages/seaborn/distributions.py:499: FutureWarning: In a future version, the
Index constructor will not infer numeric dtypes when passed object-dtype
sequences (matching Series behavior)
  pd.Index(edges, name="edges"),
/home/isaac/miniconda3/envs/cse3380/lib/python3.10/site-
packages/seaborn/distributions.py:500: FutureWarning: In a future version, the
Index constructor will not infer numeric dtypes when passed object-dtype
sequences (matching Series behavior)
  pd.Index(widths, name="widths"),
/home/isaac/miniconda3/envs/cse3380/lib/python3.10/site-
packages/seaborn/distributions.py:499: FutureWarning: In a future version, the
Index constructor will not infer numeric dtypes when passed object-dtype
sequences (matching Series behavior)
  pd.Index(edges, name="edges"),
/home/isaac/miniconda3/envs/cse3380/lib/python3.10/site-
packages/seaborn/distributions.py:500: FutureWarning: In a future version, the
Index constructor will not infer numeric dtypes when passed object-dtype
sequences (matching Series behavior)
  pd.Index(widths, name="widths"),
/home/isaac/miniconda3/envs/cse3380/lib/python3.10/site-
packages/seaborn/distributions.py:499: FutureWarning: In a future version, the
Index constructor will not infer numeric dtypes when passed object-dtype
sequences (matching Series behavior)
  pd.Index(edges, name="edges"),
/home/isaac/miniconda3/envs/cse3380/lib/python3.10/site-
packages/seaborn/distributions.py:500: FutureWarning: In a future version, the
Index constructor will not infer numeric dtypes when passed object-dtype
sequences (matching Series behavior)
  pd.Index(widths, name="widths"),
/home/isaac/miniconda3/envs/cse3380/lib/python3.10/site-
packages/seaborn/distributions.py:499: FutureWarning: In a future version, the
Index constructor will not infer numeric dtypes when passed object-dtype
sequences (matching Series behavior)
  pd.Index(edges, name="edges"),
/home/isaac/miniconda3/envs/cse3380/lib/python3.10/site-
```

```
packages/seaborn/distributions.py:500: FutureWarning: In a future version, the
Index constructor will not infer numeric dtypes when passed object-dtype
sequences (matching Series behavior)
  pd.Index(widths, name="widths"),
/home/isaac/miniconda3/envs/cse3380/lib/python3.10/site-
packages/seaborn/distributions.py:499: FutureWarning: In a future version, the
Index constructor will not infer numeric dtypes when passed object-dtype
sequences (matching Series behavior)
  pd.Index(edges, name="edges"),
/home/isaac/miniconda3/envs/cse3380/lib/python3.10/site-
packages/seaborn/distributions.py:500: FutureWarning: In a future version, the
Index constructor will not infer numeric dtypes when passed object-dtype
sequences (matching Series behavior)
  pd.Index(widths, name="widths"),
/home/isaac/miniconda3/envs/cse3380/lib/python3.10/site-
packages/seaborn/distributions.py:499: FutureWarning: In a future version, the
Index constructor will not infer numeric dtypes when passed object-dtype
sequences (matching Series behavior)
  pd.Index(edges, name="edges"),
/home/isaac/miniconda3/envs/cse3380/lib/python3.10/site-
packages/seaborn/distributions.py:500: FutureWarning: In a future version, the
Index constructor will not infer numeric dtypes when passed object-dtype
sequences (matching Series behavior)
  pd.Index(widths, name="widths"),
/home/isaac/miniconda3/envs/cse3380/lib/python3.10/site-
packages/seaborn/distributions.py:499: FutureWarning: In a future version, the
Index constructor will not infer numeric dtypes when passed object-dtype
sequences (matching Series behavior)
  pd.Index(edges, name="edges"),
/home/isaac/miniconda3/envs/cse3380/lib/python3.10/site-
packages/seaborn/distributions.py:500: FutureWarning: In a future version, the
Index constructor will not infer numeric dtypes when passed object-dtype
sequences (matching Series behavior)
  pd.Index(widths, name="widths"),
/home/isaac/miniconda3/envs/cse3380/lib/python3.10/site-
packages/seaborn/distributions.py:499: FutureWarning: In a future version, the
Index constructor will not infer numeric dtypes when passed object-dtype
sequences (matching Series behavior)
  pd.Index(edges, name="edges"),
/home/isaac/miniconda3/envs/cse3380/lib/python3.10/site-
packages/seaborn/distributions.py:500: FutureWarning: In a future version, the
Index constructor will not infer numeric dtypes when passed object-dtype
sequences (matching Series behavior)
  pd.Index(widths, name="widths"),
/home/isaac/miniconda3/envs/cse3380/lib/python3.10/site-
packages/seaborn/distributions.py:499: FutureWarning: In a future version, the
Index constructor will not infer numeric dtypes when passed object-dtype
sequences (matching Series behavior)
```

```
  pd.Index(edges, name="edges"),
/home/isaac/miniconda3/envs/cse3380/lib/python3.10/site-
packages/seaborn/distributions.py:500: FutureWarning: In a future version, the
Index constructor will not infer numeric dtypes when passed object-dtype
sequences (matching Series behavior)
  pd.Index(widths, name="widths"),
```

[23]: <seaborn.axisgrid.PairGrid at 0x7f64d160c610>



[24]:
```
breeds_names_lower = df_breeds_info.Breed.str.lower()

def findBreedInfoName(breed):
    breed = breed.lower()
```

```
    info = df_breeds_info.Breed.loc[breeds_names_lower.str.contains(breed)]
    if len(info) > 0: return info.values[0]

    for word in breed.split(' '):
        info = df_breeds_info.Breed.loc[breeds_names_lower.str.contains(word)]
        if len(info) > 0: return info.values[0]

    return None
```

[25]:
```
df_out_with_breeds_info = df_out.
 ↪assign(BreedsInfoName=[findBreedInfoName(breed) for breed in df_out.Breed])
df_out_with_breeds_info = df_out_with_breeds_info.merge(df_breeds_info,␣
 ↪how='left', left_on='BreedsInfoName', right_on='Breed')
df_out_with_breeds_info.rename(columns={'Breed_x': 'Breed', 'Breed_y': 'Breed␣
 ↪(catalog)'}, inplace=True)
df_out_with_breeds_info.info()
df_out_with_breeds_info.head()
```

```
<class 'pandas.core.frame.DataFrame'>
Int64Index: 149511 entries, 0 to 149510
Data columns (total 47 columns):
 #   Column                  Non-Null Count   Dtype
---  ------                  --------------   -----
 0   Animal ID               149511 non-null  string
 1   Name                    106260 non-null  string
 2   DateTime                149511 non-null  datetime64[ns]
 3   MonthYear               149511 non-null  string
 4   Date of Birth           149511 non-null  datetime64[ns]
 5   Outcome Type            149485 non-null  string
 6   Outcome Subtype         68443 non-null   string
 7   Animal Type             149511 non-null  string
 8   Sex upon Outcome        149509 non-null  string
 9   Age upon Outcome        149465 non-null  string
 10  Breed                   149511 non-null  string
 11  Color                   149511 non-null  string
 12  Colors (count)          149511 non-null  Int64
 13  Color 0                 149511 non-null  string
 14  Color 1                 79869 non-null   string
 15  Color 0 R               135638 non-null  Float64
 16  Color 0 G               135638 non-null  Float64
 17  Color 0 B               135638 non-null  Float64
 18  Color 0 H               135638 non-null  Float64
 19  Color 0 S               135638 non-null  Float64
 20  Color 0 V               135638 non-null  Float64
 21  Color 1 R               78596 non-null   Float64
 22  Color 1 G               78596 non-null   Float64
```

```
 23  Color 1 B                 78596 non-null   Float64
 24  Color 1 H                 78596 non-null   Float64
 25  Color 1 S                 78596 non-null   Float64
 26  Color 1 V                 78596 non-null   Float64
 27  Age upon Outcome (years)  149465 non-null  Float64
 28  Male                      149509 non-null  boolean
 29  Female                    149509 non-null  boolean
 30  NeuteredOrSpayed          149509 non-null  boolean
 31  Adopted                   149485 non-null  boolean
 32  BreedsInfoName            138419 non-null  object
 33  Breed (catalog)           138419 non-null  string
 34  Breed Group AKC           138419 non-null  string
 35  Breed Group CKC           138419 non-null  string
 36  Breed Group UKC           138419 non-null  string
 37  CKC Subgroup              138414 non-null  string
 38  height_low_inches         138419 non-null  Float64
 39  height_high_inches        138419 non-null  Float64
 40  average height            138419 non-null  Float64
 41  weight_low_lbs            138419 non-null  Float64
 42  weight_high_lbs           138419 non-null  Int64
 43  average weight            138419 non-null  Float64
 44  Lifespan Low              138415 non-null  Int64
 45  Lifespan High             138415 non-null  Int64
 46  average lifespan          138419 non-null  Float64
dtypes: Float64(19), Int64(4), boolean(4), datetime64[ns](2), object(1),
string(17)
memory usage: 54.6+ MB
```

[25]:

	Animal ID	Name	DateTime	MonthYear	Date of Birth	Outcome Type	\
0	A794011	Chunk	2019-05-08 18:20:00	May 2019	2017-05-02	Rto-Adopt	
1	A776359	Gizmo	2018-07-18 16:02:00	Jul 2018	2017-07-12	Adoption	
2	A821648	<NA>	2020-08-16 11:38:00	Aug 2020	2019-08-16	Euthanasia	
3	A720371	Moose	2016-02-13 17:59:00	Feb 2016	2015-10-08	Adoption	
4	A674754	<NA>	2014-03-18 11:47:00	Mar 2014	2014-03-12	Transfer	

	Outcome Subtype	Animal Type	Sex upon Outcome	Age upon Outcome	…	\
0	<NA>	Cat	Neutered Male	2 years	…	
1	<NA>	Dog	Neutered Male	1 year	…	
2	<NA>	Other	Unknown	1 year	…	
3	<NA>	Dog	Neutered Male	4 months	…	
4	Partner	Cat	Intact Male	6 days	…	

	CKC Subgroup	height_low_inches	\
0	11-A: Pointing Dogs	21.0	
1	12-A: Americas and Caribbean Breeds	5.0	
2	<NA>	<NA>	
3	9-A: 9-A Large Mountain/Pastoral Dogs Shepherd…	27.0	

```
4                                11-A: Pointing Dogs                21.0

   height_high_inches average height weight_low_lbs  weight_high_lbs  \
0                26.0           23.5           45.0               70
1                10.0            7.5            1.0                7
2                <NA>           <NA>           <NA>             <NA>
3                29.0           28.0          100.0              150
4                26.0           23.5           45.0               70

   average weight  Lifespan Low  Lifespan High  average lifespan
0            57.5            10             12              11.0
1             4.0            14             16              15.0
2            <NA>          <NA>           <NA>              <NA>
3           125.0            11             13              12.0
4            57.5            10             12              11.0

[5 rows x 47 columns]
```

[26]:
```
df_breeds_with_info = df_breeds.assign(BreedsInfoName=[findBreedInfoName(breed)␣
 ↪for breed in df_breeds.Breed])
df_breeds_with_info = df_breeds_with_info.merge(df_breeds_info, how='left',␣
 ↪left_on='BreedsInfoName', right_on='Breed')
df_breeds_with_info.rename(columns={'Breed_x': 'Breed', 'Breed_y': 'Breed␣
 ↪(catalog)'}, inplace=True)
df_breeds_with_info.info()
df_breeds_with_info.head()
```

```
<class 'pandas.core.frame.DataFrame'>
Int64Index: 2833 entries, 0 to 2832
Data columns (total 43 columns):
 #   Column               Non-Null Count  Dtype
---  ------               --------------  -----
 0   Breed                2833 non-null   string
 1   Count                2833 non-null   Int64
 2   Animal Type          2833 non-null   string
 3   Adopted              2088 non-null   float64
 4   Color 0 R (mean)     2721 non-null   Float64
 5   Color 0 R (std dev)  1698 non-null   float64
 6   Color 0 G (mean)     2721 non-null   Float64
 7   Color 0 G (std dev)  1698 non-null   float64
 8   Color 0 B (mean)     2721 non-null   Float64
 9   Color 0 B (std dev)  1698 non-null   float64
 10  Color 0 H (mean)     2721 non-null   Float64
 11  Color 0 H (std dev)  1698 non-null   float64
 12  Color 0 S (mean)     2721 non-null   Float64
 13  Color 0 S (std dev)  1698 non-null   float64
 14  Color 0 V (mean)     2721 non-null   Float64
```

```
 15  Color 0 V (std dev)  1698 non-null   float64
 16  Color 1 R (mean)     2270 non-null   Float64
 17  Color 1 R (std dev)  1382 non-null   float64
 18  Color 1 G (mean)     2270 non-null   Float64
 19  Color 1 G (std dev)  1382 non-null   float64
 20  Color 1 B (mean)     2270 non-null   Float64
 21  Color 1 B (std dev)  1382 non-null   float64
 22  Color 1 H (mean)     2270 non-null   Float64
 23  Color 1 H (std dev)  1382 non-null   float64
 24  Color 1 S (mean)     2270 non-null   Float64
 25  Color 1 S (std dev)  1382 non-null   float64
 26  Color 1 V (mean)     2270 non-null   Float64
 27  Color 1 V (std dev)  1382 non-null   float64
 28  BreedsInfoName       2425 non-null   object
 29  Breed (catalog)      2425 non-null   string
 30  Breed Group AKC      2425 non-null   string
 31  Breed Group CKC      2425 non-null   string
 32  Breed Group UKC      2425 non-null   string
 33  CKC Subgroup         2424 non-null   string
 34  height_low_inches    2425 non-null   Float64
 35  height_high_inches   2425 non-null   Float64
 36  average height       2425 non-null   Float64
 37  weight_low_lbs       2425 non-null   Float64
 38  weight_high_lbs      2425 non-null   Int64
 39  average weight       2425 non-null   Float64
 40  Lifespan Low         2424 non-null   Int64
 41  Lifespan High        2424 non-null   Int64
 42  average lifespan     2425 non-null   Float64
dtypes: Float64(18), Int64(4), float64(13), object(1), string(7)
memory usage: 1.0+ MB
```

[26]:

	Breed	Count	Animal Type	Adopted	Color 0 R (mean)	\
0	Domestic Shorthair Mix	33260	Cat	0.461425	0.439476	
1	Domestic Shorthair	13808	Cat	0.553158	0.451115	
2	Pit Bull Mix	9406	Dog	0.431427	0.513666	
3	Labrador Retriever Mix	7913	Dog	0.546063	0.409771	
4	Chihuahua Shorthair Mix	6689	Dog	0.483181	0.609789	

	Color 0 R (std dev)	Color 0 G (mean)	Color 0 G (std dev)	\
0	0.412274	0.322711	0.323957	
1	0.412934	0.331264	0.324532	
2	0.403283	0.418784	0.381554	
3	0.421755	0.329495	0.388036	
4	0.370759	0.493648	0.361854	

	Color 0 B (mean)	Color 0 B (std dev)	…	\
0	0.286948	0.413041	…	

```
1          0.293482             0.413847  …
2          0.476534             0.439715  …
3          0.181561             0.323025  …
4          0.356013             0.369441  …

                          CKC Subgroup  height_low_inches  \
0                  11-A: Pointing Dogs               21.0
1                  11-A: Pointing Dogs               21.0
2          4-B: Bull-and-Terrier Breeds               17.0
3        11-C: Retrievers and Waterdogs               21.0
4  12-A: Americas and Caribbean Breeds                5.0

   height_high_inches  average height  weight_low_lbs  weight_high_lbs  \
0                26.0            23.5            45.0               70
1                26.0            23.5            45.0               70
2                22.0            19.5            30.0               75
3                25.0            23.0            55.0               80
4                10.0             7.5             1.0                7

   average weight  Lifespan Low  Lifespan High  average lifespan
0            57.5            10             12              11.0
1            57.5            10             12              11.0
2            52.5            10             12              11.0
3            67.5            10             12              11.0
4             4.0            14             16              15.0

[5 rows x 43 columns]
```

[27]:
```
df_out_with_breeds_info['Est. lifespan remaining'] =␣
 ↪df_out_with_breeds_info['average lifespan'] - df_out_with_breeds_info['Age␣
 ↪upon Outcome (years)']
df_out_with_breeds_info['Est. lifespan remaining'] =␣
 ↪df_out_with_breeds_info['Est. lifespan remaining'].astype(dtype=float)
df_out_with_breeds_info.info()
df_out_with_breeds_info['Est. lifespan remaining']
```

```
<class 'pandas.core.frame.DataFrame'>
Int64Index: 149511 entries, 0 to 149510
Data columns (total 48 columns):
 #   Column                   Non-Null Count   Dtype
---  ------                   --------------   -----
 0   Animal ID                149511 non-null  string
 1   Name                     106260 non-null  string
 2   DateTime                 149511 non-null  datetime64[ns]
 3   MonthYear                149511 non-null  string
 4   Date of Birth            149511 non-null  datetime64[ns]
 5   Outcome Type             149485 non-null  string
```

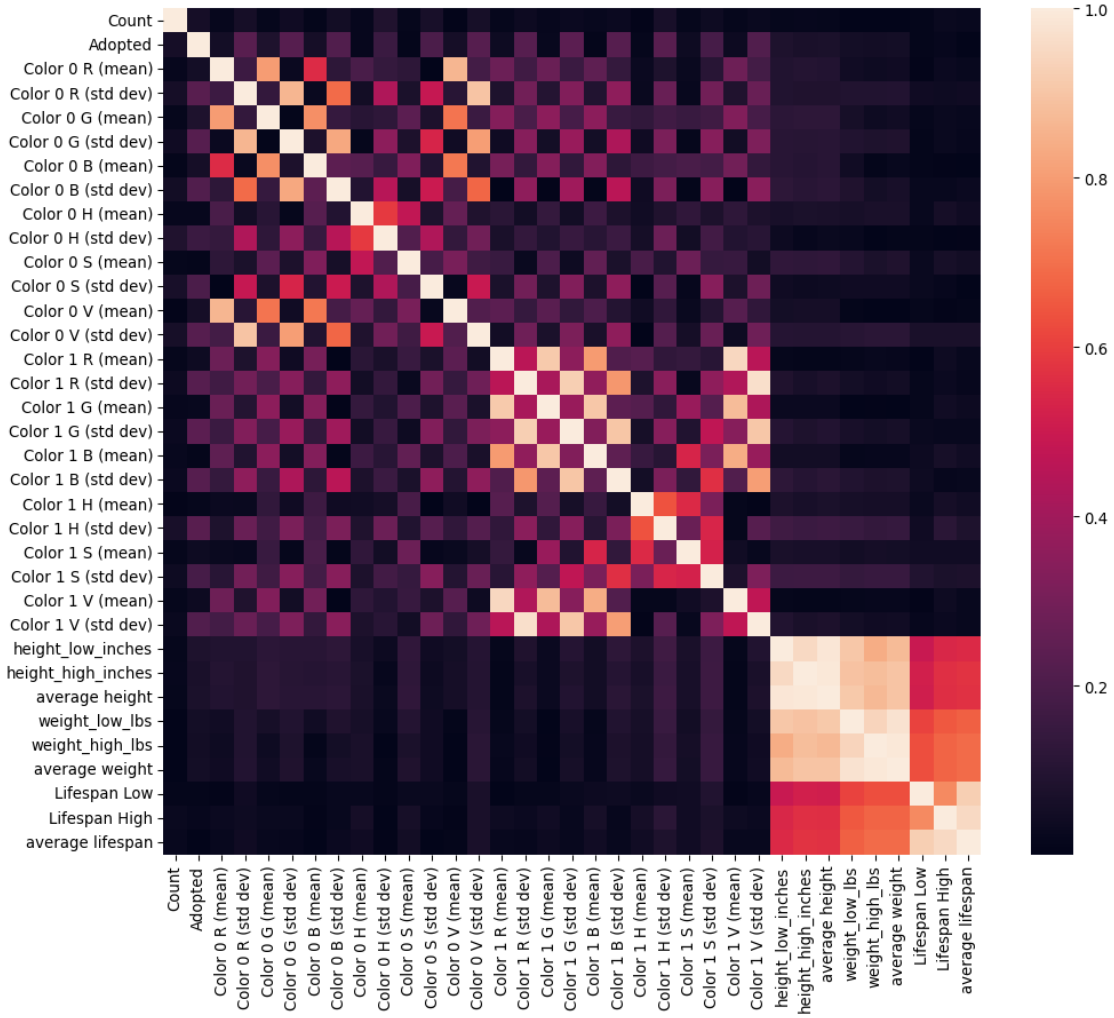
```
 6   Outcome Subtype           68443 non-null   string
 7   Animal Type               149511 non-null  string
 8   Sex upon Outcome          149509 non-null  string
 9   Age upon Outcome          149465 non-null  string
 10  Breed                     149511 non-null  string
 11  Color                     149511 non-null  string
 12  Colors (count)            149511 non-null  Int64
 13  Color 0                   149511 non-null  string
 14  Color 1                   79869 non-null   string
 15  Color 0 R                 135638 non-null  Float64
 16  Color 0 G                 135638 non-null  Float64
 17  Color 0 B                 135638 non-null  Float64
 18  Color 0 H                 135638 non-null  Float64
 19  Color 0 S                 135638 non-null  Float64
 20  Color 0 V                 135638 non-null  Float64
 21  Color 1 R                 78596 non-null   Float64
 22  Color 1 G                 78596 non-null   Float64
 23  Color 1 B                 78596 non-null   Float64
 24  Color 1 H                 78596 non-null   Float64
 25  Color 1 S                 78596 non-null   Float64
 26  Color 1 V                 78596 non-null   Float64
 27  Age upon Outcome (years)  149465 non-null  Float64
 28  Male                      149509 non-null  boolean
 29  Female                    149509 non-null  boolean
 30  NeuteredOrSpayed          149509 non-null  boolean
 31  Adopted                   149485 non-null  boolean
 32  BreedsInfoName            138419 non-null  object
 33  Breed (catalog)           138419 non-null  string
 34  Breed Group AKC           138419 non-null  string
 35  Breed Group CKC           138419 non-null  string
 36  Breed Group UKC           138419 non-null  string
 37  CKC Subgroup              138414 non-null  string
 38  height_low_inches         138419 non-null  Float64
 39  height_high_inches        138419 non-null  Float64
 40  average height            138419 non-null  Float64
 41  weight_low_lbs            138419 non-null  Float64
 42  weight_high_lbs           138419 non-null  Int64
 43  average weight            138419 non-null  Float64
 44  Lifespan Low              138415 non-null  Int64
 45  Lifespan High             138415 non-null  Int64
 46  average lifespan          138419 non-null  Float64
 47  Est. lifespan remaining   138408 non-null  float64
dtypes: Float64(19), Int64(4), boolean(4), datetime64[ns](2), float64(1),
object(1), string(17)
memory usage: 55.8+ MB
```

[27]:
```
0          9.000000
1         14.000000
2               NaN
3         11.666667
4         10.983562
             …
149506          NaN
149507    14.000000
149508    12.750000
149509    14.750000
149510    10.833333
Name: Est. lifespan remaining, Length: 149511, dtype: float64
```

There isn't much correlation appearing yet

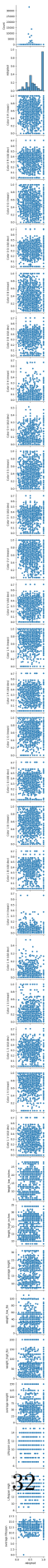
[40]:
```
df_breeds_with_info_corr = df_breeds_with_info.corr()

plt.figure(num=None, figsize=(12, 10), dpi=96, facecolor='w', edgecolor='k')
sns.heatmap(data=df_breeds_with_info_corr.abs())

def score(df, var1, var2):
    print(f'Corr({var1}, {var2})   {df[var1][var2]}')

score(df_breeds_with_info_corr, 'Adopted', 'Color 0 B (mean)')
score(df_breeds_with_info_corr, 'Adopted', 'Color 0 B (std dev)')
score(df_breeds_with_info_corr, 'Adopted', 'Color 0 V (mean)')
score(df_breeds_with_info_corr, 'Adopted', 'Color 0 V (std dev)')
score(df_breeds_with_info_corr, 'Adopted', 'average height')
score(df_breeds_with_info_corr, 'Adopted', 'height_low_inches')
score(df_breeds_with_info_corr, 'Adopted', 'height_high_inches')
score(df_breeds_with_info_corr, 'Adopted', 'Lifespan Low')
```

```
/tmp/ipykernel_29164/4118066584.py:1: FutureWarning: The default value of
numeric_only in DataFrame.corr is deprecated. In a future version, it will
default to False. Select only valid columns or specify the value of numeric_only
to silence this warning.
  df_breeds_with_info_corr = df_breeds_with_info.corr()
Corr(Adopted, Color 0 B (mean))   -0.057521961020765885
Corr(Adopted, Color 0 B (std dev))   -0.21220098425344674
Corr(Adopted, Color 0 V (mean))   -0.05892713325516749
Corr(Adopted, Color 0 V (std dev))   -0.22375794566214077
Corr(Adopted, average height)   0.07520172186737319
Corr(Adopted, height_low_inches)   0.08043859187253975
Corr(Adopted, height_high_inches)   0.06827302387620472
Corr(Adopted, Lifespan Low)   0.011194168083224364
```



[41]:
```
sns.pairplot(data=df_breeds_with_info, x_vars=['Adopted'])
```

[41]: <seaborn.axisgrid.PairGrid at 0x7f64c1bdeb90>

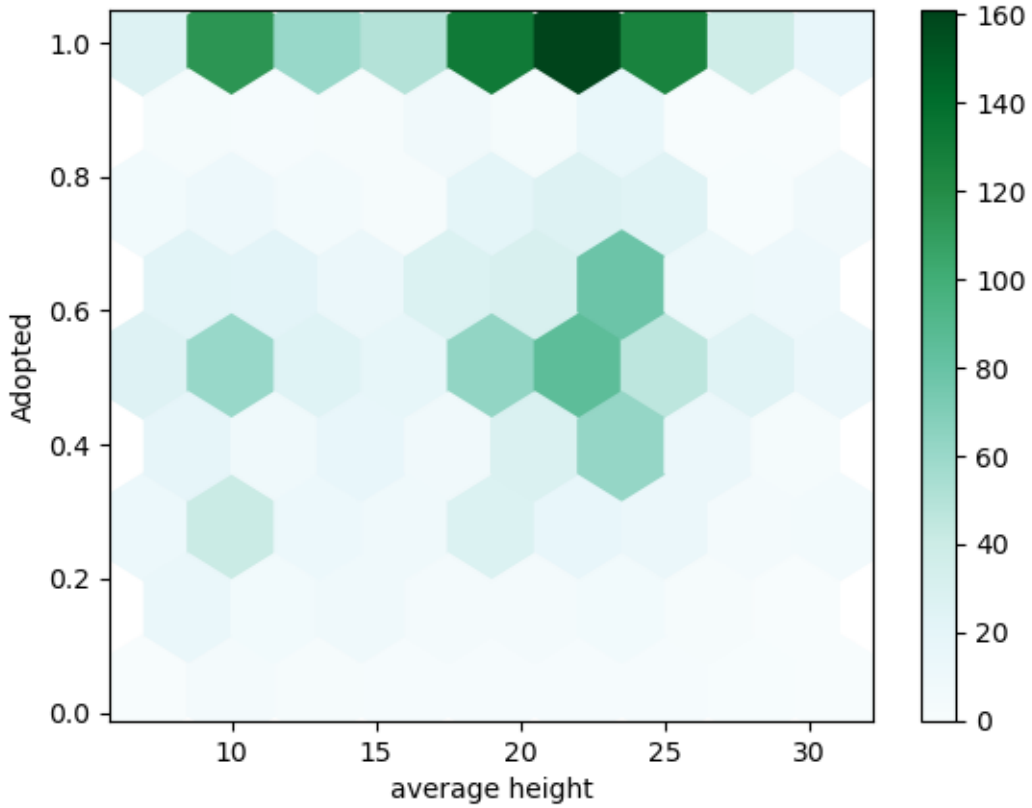

Count
Adopted
Child 1 Gender
Child 1 DOB Mon
Child 2 Gender
Child 2 DOB Mon
Child 3 Gender
Child 3 DOB Mon
Child 4 Gender
Child 4 DOB Mon
Child 5 Gender
Child 5 DOB Mon
Child 6 Gender
Child 6 DOB Mon
Child 7 Gender
Child 7 DOB Mon
Child 8 Gender
Child 8 DOB Mon
Child 9 Gender
Child 9 DOB Mon
Child 10 Gender
Child 10 DOB Mon
Child 11 Gender
Child 11 DOB Mon
Child 12 Gender
Child 12 DOB Mon
Child 13 Gender
Child 13 DOB Mon
Child 14 Gender
Child 14 DOB Mon
Child 15 Gender
Child 15 DOB Mon
Mother_Age_Births
Father_Age_Births
Birthplace
Mother_Edu
Father_Edu
Child Had Disease

2.2 Height ~ adopted?

Is the average height of a breed correlated with its likelihood of being adopted? The Pearson correlation coefficient was Corr(Adopted, average height) 0.2286839421877296.

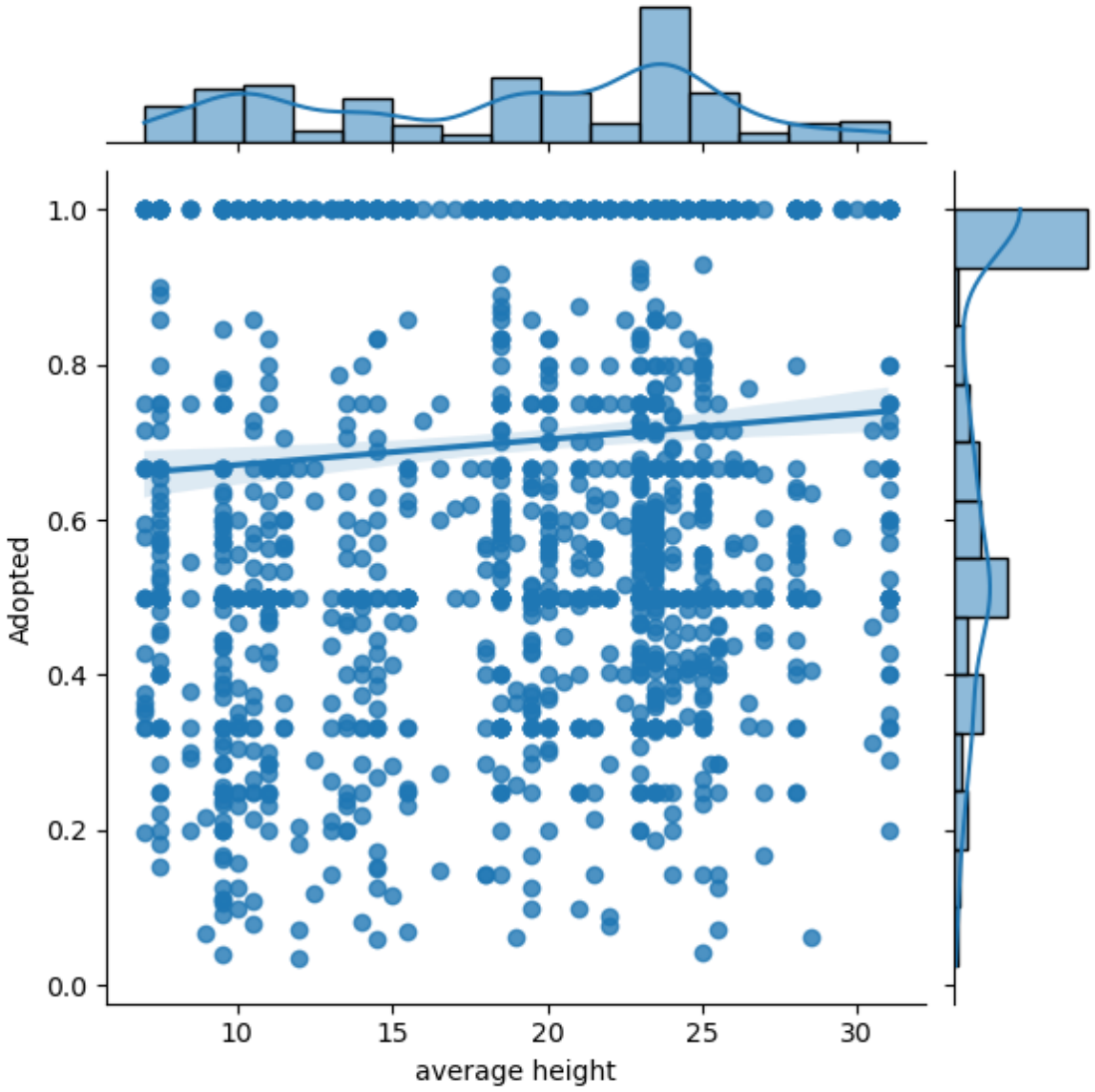
[30]:
```
df_breeds_with_info.plot.hexbin(x='average height', y='Adopted', gridsize=8)
```

[30]:
```
<AxesSubplot:xlabel='average height', ylabel='Adopted'>
```



[31]:
```
sns.jointplot(
    x=df_breeds_with_info['average height'].astype(dtype=float),
    y=df_breeds_with_info.Adopted.astype(dtype=float),
    kind='reg')
```

[31]:
```
<seaborn.axisgrid.JointGrid at 0x7f64c9657af0>
```



3 Analysis by individuals

3.1 Color

(results)

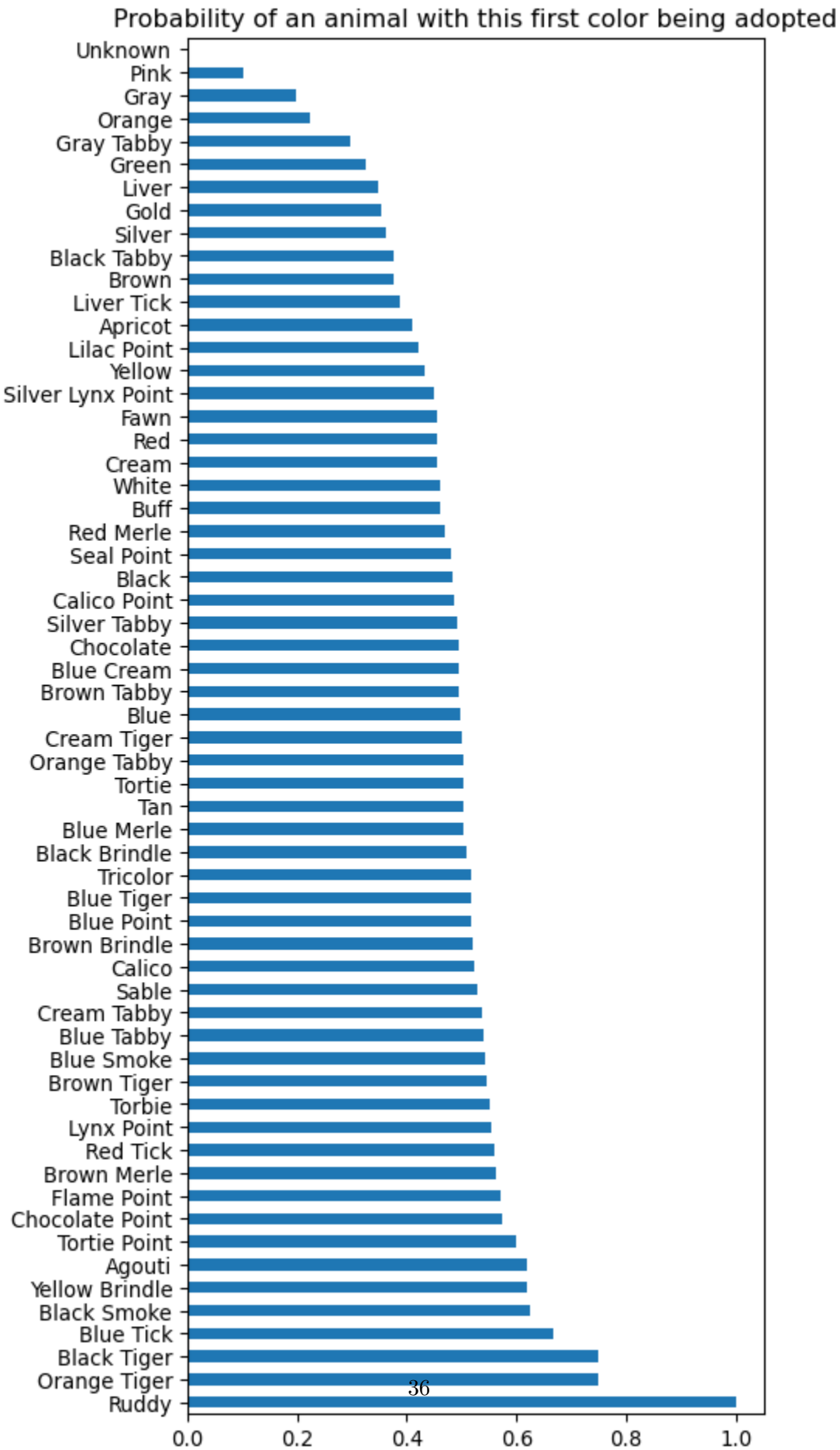
[32]:
```
print('Colors')
print(df_out_with_breeds_info['Color 0'].unique())
```

```
Colors
<StringArray>
[      'Brown Tabby',              'White',               'Gray',
              'Buff',       'Orange Tabby',              'Brown',
```

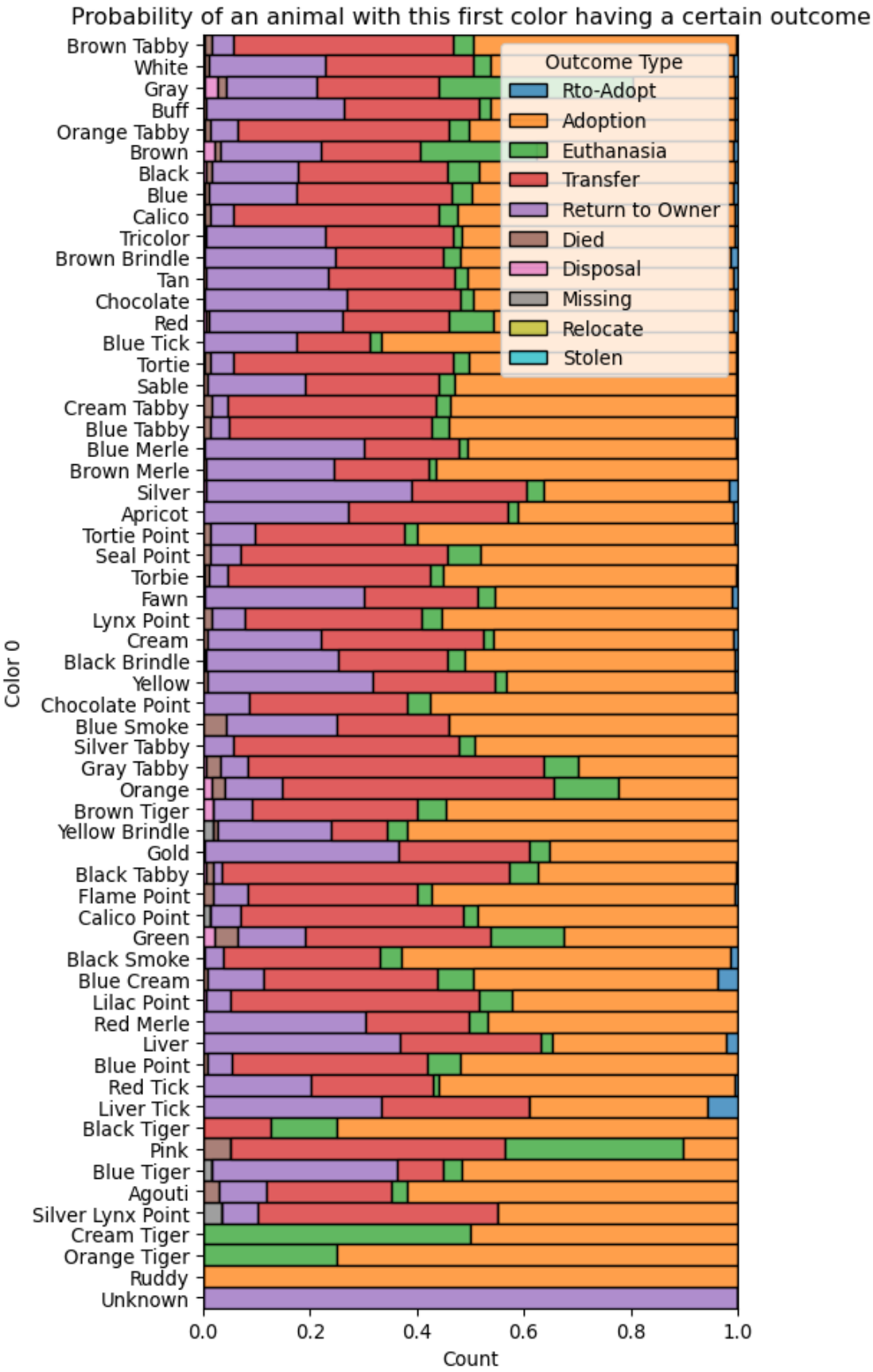
```
            'Black',              'Blue',            'Calico',
          'Tricolor',     'Brown Brindle',               'Tan',
        'Chocolate',               'Red',         'Blue Tick',
           'Tortie',            'Sable',       'Cream Tabby',
       'Blue Tabby',        'Blue Merle',       'Brown Merle',
           'Silver',           'Apricot',      'Tortie Point',
       'Seal Point',            'Torbie',              'Fawn',
       'Lynx Point',             'Cream',     'Black Brindle',
           'Yellow',   'Chocolate Point',        'Blue Smoke',
     'Silver Tabby',        'Gray Tabby',            'Orange',
      'Brown Tiger',    'Yellow Brindle',              'Gold',
      'Black Tabby',       'Flame Point',      'Calico Point',
            'Green',       'Black Smoke',        'Blue Cream',
      'Lilac Point',         'Red Merle',             'Liver',
       'Blue Point',          'Red Tick',        'Liver Tick',
      'Black Tiger',              'Pink',        'Blue Tiger',
           'Agouti', 'Silver Lynx Point',       'Cream Tiger',
     'Orange Tiger',             'Ruddy',           'Unknown']
Length: 60, dtype: string
```

[33]:
```
colors_adopted = bigCorr_bernoulli(df_out, 'Color 0', 'Adopted')
colors_count = df_out['Color 0'].value_counts()
df_colors = pd.DataFrame(index=colors_count.index)
df_colors = df_colors.assign(**{'Color 0': colors_count.index })
df_colors = df_colors.assign(Count=colors_count, Adopted=colors_adopted)
df_colors.sort_values(by='Adopted', ascending=False, inplace=True)

print(f'{len(df_colors)} colors')

plt.figure(num=None, figsize=(5, 12), dpi=96, facecolor='w', edgecolor='k')
plt.title('Probability of an animal with this first color being adopted')
df_colors.Adopted.plot.barh(x='Color 0')
plt.show()

df_colors_outcomes = df_out[['Outcome Type', 'Color 0']]

plt.figure(num=None, figsize=(5, 12), dpi=96, facecolor='w', edgecolor='k')
plt.title('Probability of an animal with this first color having a certain␣
 ↪outcome')
sns.histplot(
    data=df_colors_outcomes,
    y='Color 0',
    hue='Outcome Type',
    multiple='fill',
)
```

```
60 colors
```

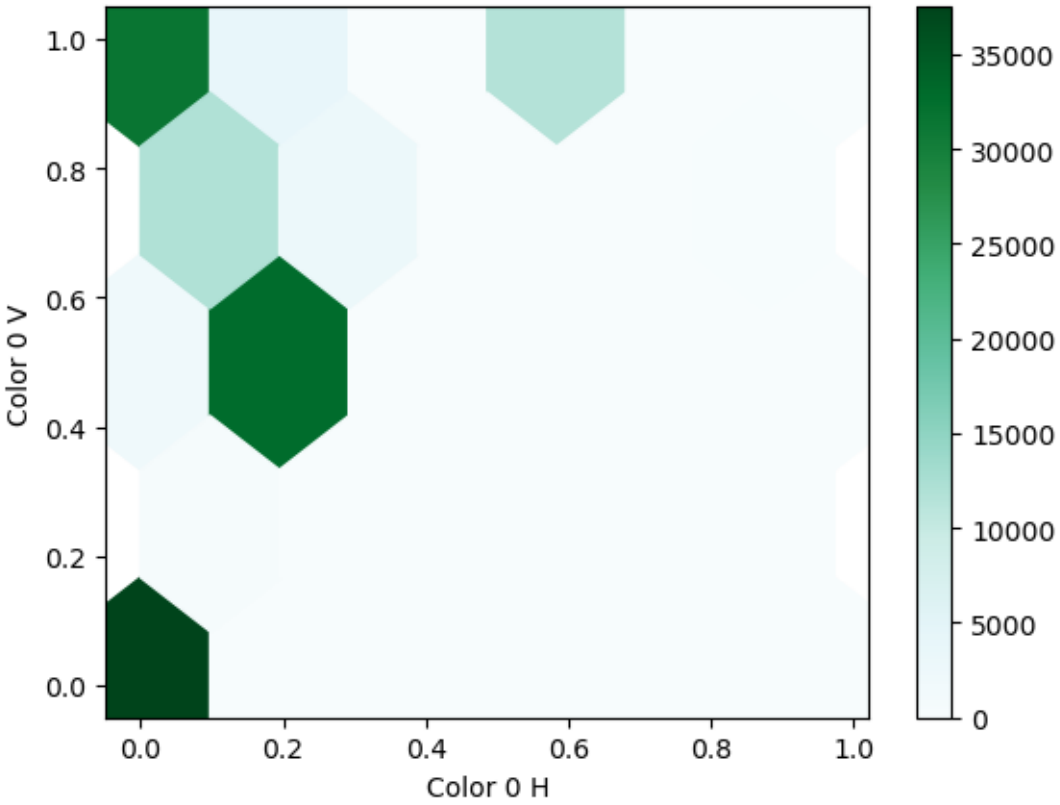

Probability of an animal with this first color being adopted
Unknown
Pink
Gray
Orange
Gray Tabby
Green
Liver
Gold
Silver
Black Tabby
Brown
Liver Tick
Apricot
Lilac Point
Yellow
Silver Lynx Point
Fawn
Red
Cream
White
Buff
Red Merle
Seal Point
Black
Calico Point
Silver Tabby
Chocolate
Blue Cream
Brown Tabby
Blue
Cream Tiger
Orange Tabby
Tortie
Tan
Blue Merle
Black Brindle
Tricolor
Blue Tiger
Blue Point
Brown Brindle
Calico
Sable
Cream Tabby
Blue Tabby
Blue Smoke
Brown Tiger
Torbie
Lynx Point
Red Tick
Brown Merle
Flame Point
Chocolate Point
Tortie Point
Agouti
Yellow Brindle
Black Smoke
Blue Tick
Black Tiger
Orange Tiger
Ruddy
0.0
0.2
0.4
0.6
0.8
1.0

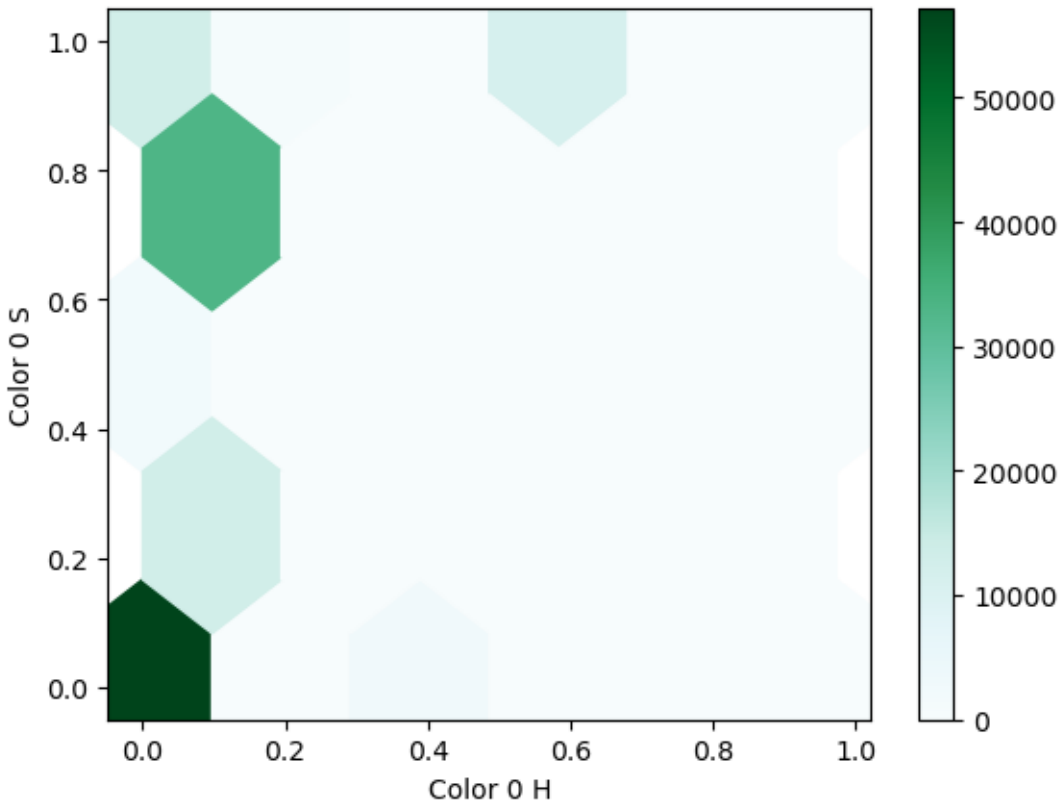
[33]: <AxesSubplot:title={'center':'Probability of an animal with this first color having a certain outcome'}, xlabel='Count', ylabel='Color 0'>

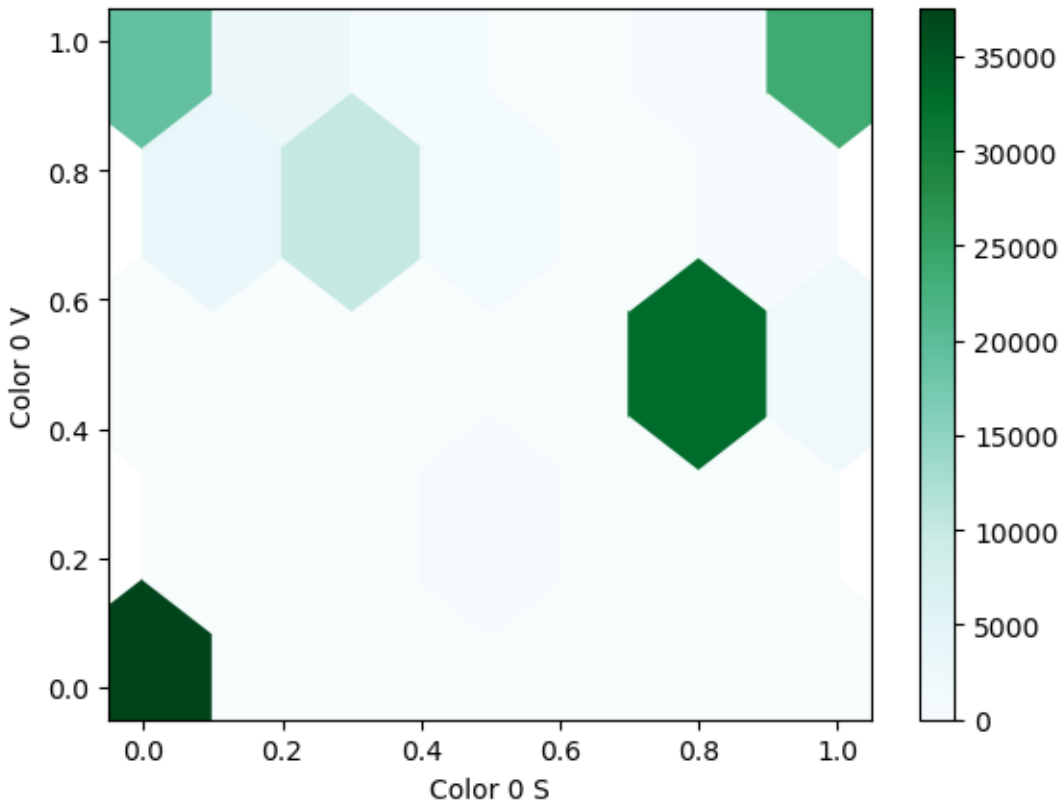

Probability of an animal with this first color having a certain outcome
Outcome Type
Rto-Adopt
Adoption
Euthanasia
Transfer
Return to Owner
Died
Disposal
Missing
Relocate
Stolen
Color 0
Brown Tabby
White
Gray
Buff
Orange Tabby
Brown
Black
Blue
Calico
Tricolor
Brown Brindle
Tan
Chocolate
Red
Blue Tick
Tortie
Sable
Cream Tabby
Blue Tabby
Blue Merle
Brown Merle
Silver
Apricot
Tortie Point
Seal Point
Torbie
Fawn
Lynx Point
Cream
Black Brindle
Yellow
Chocolate Point
Blue Smoke
Silver Tabby
Gray Tabby
Orange
Brown Tiger
Yellow Brindle
Gold
Black Tabby
Flame Point
Calico Point
Green
Black Smoke
Blue Cream
Lilac Point
Red Merle
Liver
Blue Point
Red Tick
Liver Tick
Black Tiger
Pink
Blue Tiger
Agouti
Silver Lynx Point
Cream Tiger
Orange Tiger
Ruddy
Unknown
0.0
0.2
0.4
0.6
0.8
1.0
Count

[34]:
```
df_out.plot.hexbin(x='Color 0 H', y='Color 0 V', gridsize=5)
df_out.plot.hexbin(x='Color 0 H', y='Color 0 S', gridsize=5)
df_out.plot.hexbin(x='Color 0 S', y='Color 0 V', gridsize=5)
```

[34]:
```
<AxesSubplot:xlabel='Color 0 S', ylabel='Color 0 V'>
```




1.0
0.8
0.6
0.4
0.2
0.0
Color 0 S
0.0
0.2
0.4
0.6
0.8
1.0
Color 0 H
50000
40000
30000
20000
10000
0



3.2 Breed characteristics

This analysis considers individual animals and looks for correlations between characteristics of their breed and their outcome.

It looks like the animals belonging to a breed with an average height around 20-25 (inches?) are more likely to be adopted than others, and animals between 5-12 inches are less likely than others to be adopted.

TODO: interpret the other graphs. Why are the different lifespan variables distributed the way they are, and why are they distributed differently compared to each other?

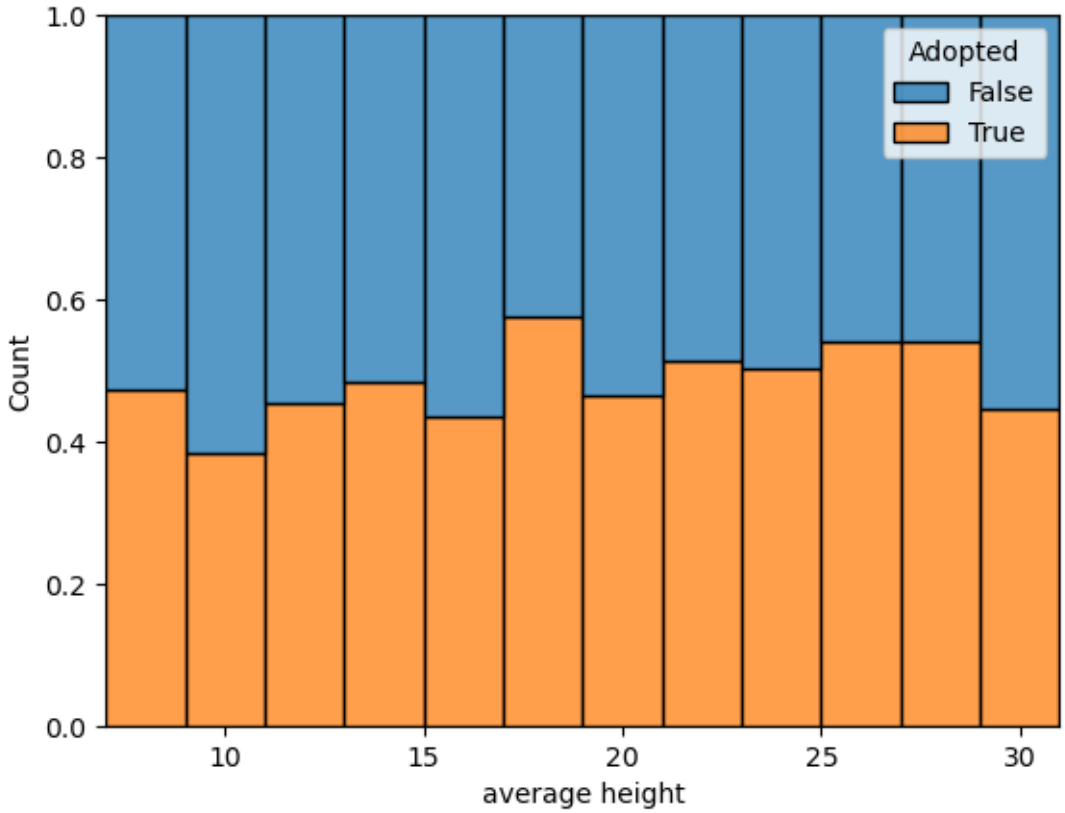
[35]:
```
df_out_1 = df_out.assign(Adopted=df_out.Adopted.fillna(False))
df_out_with_breeds_info_1 = df_out_with_breeds_info.assign(Adopted=df_out.
  ↪Adopted.fillna(False))

def correlo_histogram(df, independent, dependent, binwidth):
    print(f'{independent} ~ {dependent}')
    sns.histplot(data=df,
                 x=independent,
                 hue=dependent,
                 multiple='fill',
```

```
            binwidth=binwidth)
    plt.show()

independent_vars_breeds_info = [
    ['average height', 2],
    ['Est. lifespan remaining', 1],
    ['average lifespan', 1],
    ['Lifespan Low', 1],
    ['Lifespan High', 1]
]

independent_vars_individuals = [
    ['Age upon Outcome (years)', 1],
    ['Color 0 H', 0.1],
    ['Color 0 S', 0.1],
    ['Color 0 V', 0.1]
]

for [independent, binwidth] in independent_vars_breeds_info:
    for dependent in ['Adopted', 'Outcome Type']:
        correlo_histogram(df_out_with_breeds_info_1, independent, dependent,␣
 ↪binwidth)

for [independent, binwidth] in independent_vars_individuals:
    for dependent in ['Adopted', 'Outcome Type']:
        correlo_histogram(df_out_1, independent, dependent, binwidth)
```

average height ~ Adopted

```
/home/isaac/miniconda3/envs/cse3380/lib/python3.10/site-
packages/seaborn/distributions.py:499: FutureWarning: In a future version, the
Index constructor will not infer numeric dtypes when passed object-dtype
sequences (matching Series behavior)
  pd.Index(edges, name="edges"),
/home/isaac/miniconda3/envs/cse3380/lib/python3.10/site-
packages/seaborn/distributions.py:500: FutureWarning: In a future version, the
Index constructor will not infer numeric dtypes when passed object-dtype
sequences (matching Series behavior)
  pd.Index(widths, name="widths"),
/home/isaac/miniconda3/envs/cse3380/lib/python3.10/site-
packages/seaborn/distributions.py:499: FutureWarning: In a future version, the
Index constructor will not infer numeric dtypes when passed object-dtype
sequences (matching Series behavior)
  pd.Index(edges, name="edges"),
/home/isaac/miniconda3/envs/cse3380/lib/python3.10/site-
packages/seaborn/distributions.py:500: FutureWarning: In a future version, the
Index constructor will not infer numeric dtypes when passed object-dtype
sequences (matching Series behavior)
```

```
  pd.Index(widths, name="widths"),
```

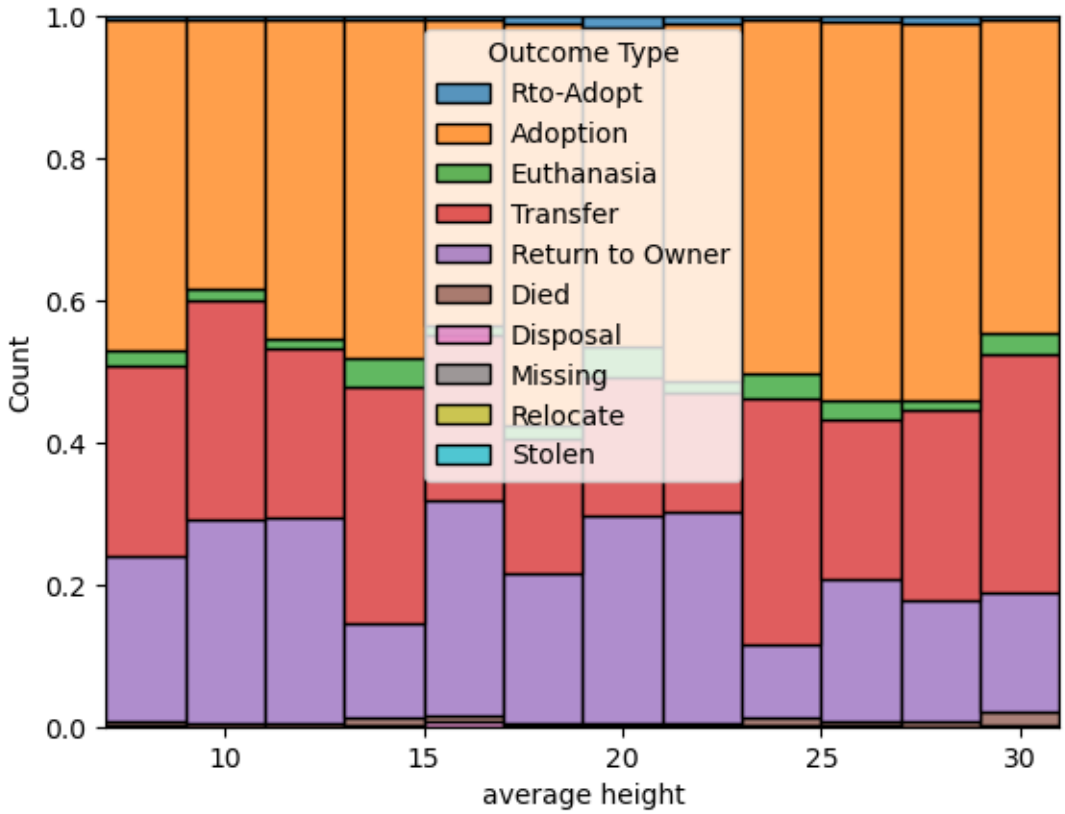



```
average height ~ Outcome Type
```

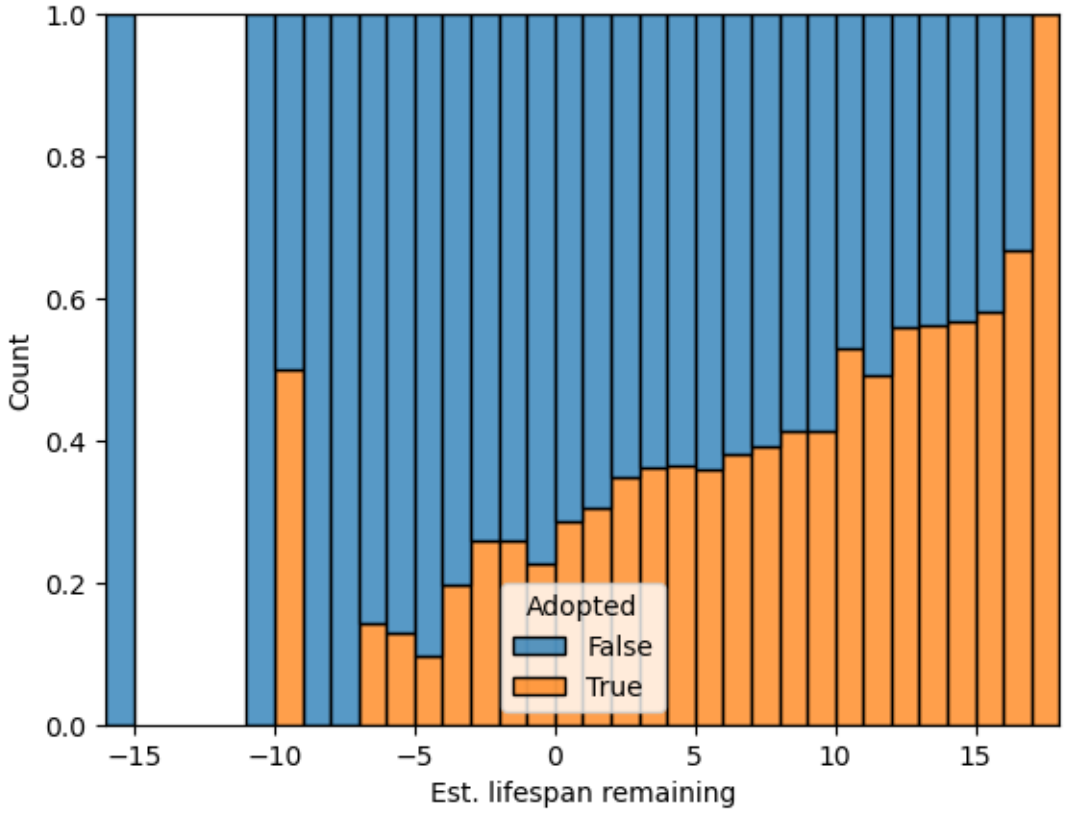
```
/home/isaac/miniconda3/envs/cse3380/lib/python3.10/site-
packages/seaborn/distributions.py:499: FutureWarning: In a future version, the
Index constructor will not infer numeric dtypes when passed object-dtype
sequences (matching Series behavior)
  pd.Index(edges, name="edges"),
/home/isaac/miniconda3/envs/cse3380/lib/python3.10/site-
packages/seaborn/distributions.py:500: FutureWarning: In a future version, the
Index constructor will not infer numeric dtypes when passed object-dtype
sequences (matching Series behavior)
  pd.Index(widths, name="widths"),
/home/isaac/miniconda3/envs/cse3380/lib/python3.10/site-
packages/seaborn/distributions.py:499: FutureWarning: In a future version, the
Index constructor will not infer numeric dtypes when passed object-dtype
sequences (matching Series behavior)
  pd.Index(edges, name="edges"),
/home/isaac/miniconda3/envs/cse3380/lib/python3.10/site-
packages/seaborn/distributions.py:500: FutureWarning: In a future version, the
Index constructor will not infer numeric dtypes when passed object-dtype
```

```
sequences (matching Series behavior)
  pd.Index(widths, name="widths"),
/home/isaac/miniconda3/envs/cse3380/lib/python3.10/site-
packages/seaborn/distributions.py:499: FutureWarning: In a future version, the
Index constructor will not infer numeric dtypes when passed object-dtype
sequences (matching Series behavior)
  pd.Index(edges, name="edges"),
/home/isaac/miniconda3/envs/cse3380/lib/python3.10/site-
packages/seaborn/distributions.py:500: FutureWarning: In a future version, the
Index constructor will not infer numeric dtypes when passed object-dtype
sequences (matching Series behavior)
  pd.Index(widths, name="widths"),
/home/isaac/miniconda3/envs/cse3380/lib/python3.10/site-
packages/seaborn/distributions.py:499: FutureWarning: In a future version, the
Index constructor will not infer numeric dtypes when passed object-dtype
sequences (matching Series behavior)
  pd.Index(edges, name="edges"),
/home/isaac/miniconda3/envs/cse3380/lib/python3.10/site-
packages/seaborn/distributions.py:500: FutureWarning: In a future version, the
Index constructor will not infer numeric dtypes when passed object-dtype
sequences (matching Series behavior)
  pd.Index(widths, name="widths"),
/home/isaac/miniconda3/envs/cse3380/lib/python3.10/site-
packages/seaborn/distributions.py:499: FutureWarning: In a future version, the
Index constructor will not infer numeric dtypes when passed object-dtype
sequences (matching Series behavior)
  pd.Index(edges, name="edges"),
/home/isaac/miniconda3/envs/cse3380/lib/python3.10/site-
packages/seaborn/distributions.py:500: FutureWarning: In a future version, the
Index constructor will not infer numeric dtypes when passed object-dtype
sequences (matching Series behavior)
  pd.Index(widths, name="widths"),
/home/isaac/miniconda3/envs/cse3380/lib/python3.10/site-
packages/seaborn/distributions.py:499: FutureWarning: In a future version, the
Index constructor will not infer numeric dtypes when passed object-dtype
sequences (matching Series behavior)
  pd.Index(edges, name="edges"),
/home/isaac/miniconda3/envs/cse3380/lib/python3.10/site-
packages/seaborn/distributions.py:500: FutureWarning: In a future version, the
Index constructor will not infer numeric dtypes when passed object-dtype
sequences (matching Series behavior)
  pd.Index(widths, name="widths"),
/home/isaac/miniconda3/envs/cse3380/lib/python3.10/site-
packages/seaborn/distributions.py:499: FutureWarning: In a future version, the
Index constructor will not infer numeric dtypes when passed object-dtype
sequences (matching Series behavior)
  pd.Index(edges, name="edges"),
/home/isaac/miniconda3/envs/cse3380/lib/python3.10/site-
```

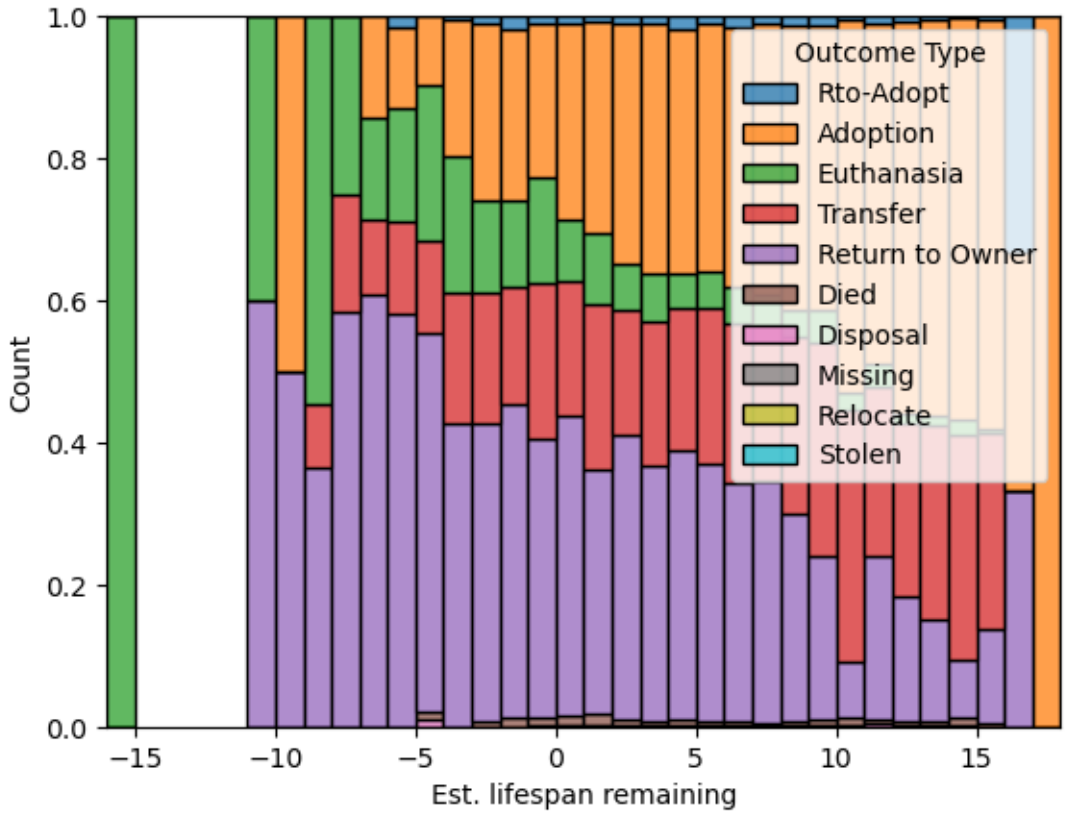
```
packages/seaborn/distributions.py:500: FutureWarning: In a future version, the
Index constructor will not infer numeric dtypes when passed object-dtype
sequences (matching Series behavior)
  pd.Index(widths, name="widths"),
/home/isaac/miniconda3/envs/cse3380/lib/python3.10/site-
packages/seaborn/distributions.py:499: FutureWarning: In a future version, the
Index constructor will not infer numeric dtypes when passed object-dtype
sequences (matching Series behavior)
  pd.Index(edges, name="edges"),
/home/isaac/miniconda3/envs/cse3380/lib/python3.10/site-
packages/seaborn/distributions.py:500: FutureWarning: In a future version, the
Index constructor will not infer numeric dtypes when passed object-dtype
sequences (matching Series behavior)
  pd.Index(widths, name="widths"),
/home/isaac/miniconda3/envs/cse3380/lib/python3.10/site-
packages/seaborn/distributions.py:499: FutureWarning: In a future version, the
Index constructor will not infer numeric dtypes when passed object-dtype
sequences (matching Series behavior)
  pd.Index(edges, name="edges"),
/home/isaac/miniconda3/envs/cse3380/lib/python3.10/site-
packages/seaborn/distributions.py:500: FutureWarning: In a future version, the
Index constructor will not infer numeric dtypes when passed object-dtype
sequences (matching Series behavior)
  pd.Index(widths, name="widths"),
/home/isaac/miniconda3/envs/cse3380/lib/python3.10/site-
packages/seaborn/distributions.py:499: FutureWarning: In a future version, the
Index constructor will not infer numeric dtypes when passed object-dtype
sequences (matching Series behavior)
  pd.Index(edges, name="edges"),
/home/isaac/miniconda3/envs/cse3380/lib/python3.10/site-
packages/seaborn/distributions.py:500: FutureWarning: In a future version, the
Index constructor will not infer numeric dtypes when passed object-dtype
sequences (matching Series behavior)
  pd.Index(widths, name="widths"),
```



Est. lifespan remaining ~ Adopted

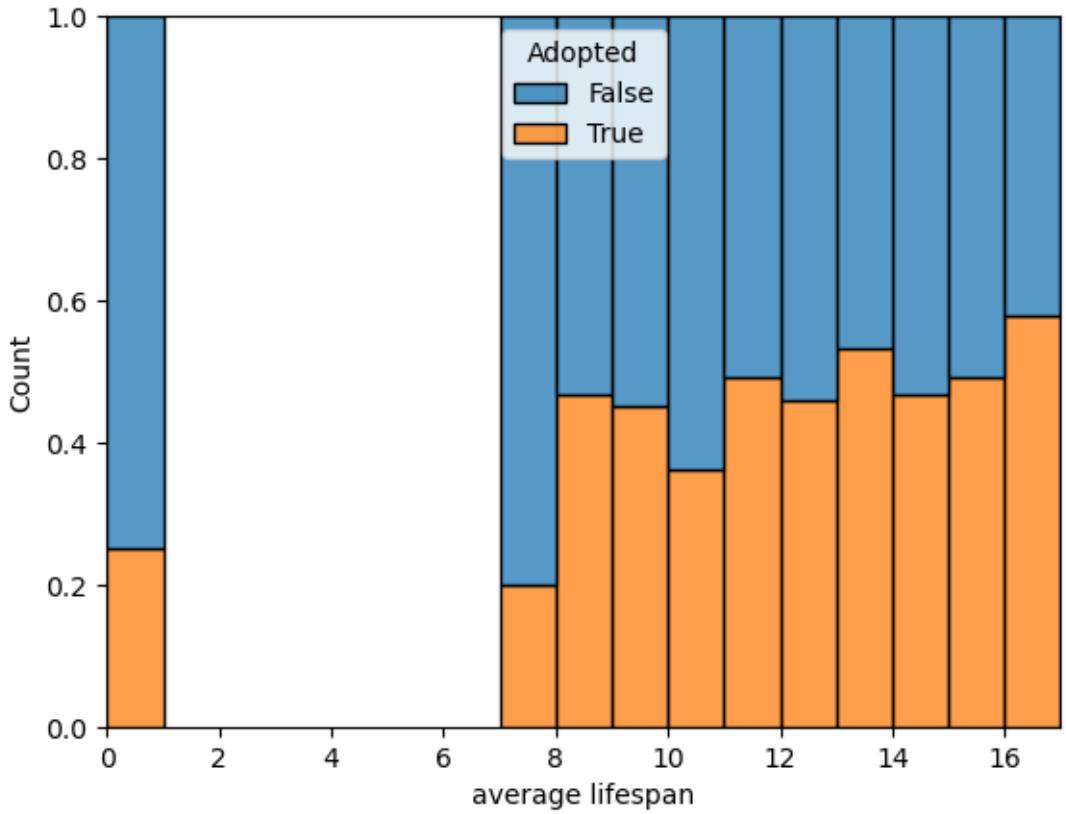


`Est. lifespan remaining ~ Outcome Type`




```
average lifespan ~ Adopted
```

```
/home/isaac/miniconda3/envs/cse3380/lib/python3.10/site-
packages/seaborn/distributions.py:499: FutureWarning: In a future version, the
Index constructor will not infer numeric dtypes when passed object-dtype
sequences (matching Series behavior)
  pd.Index(edges, name="edges"),
/home/isaac/miniconda3/envs/cse3380/lib/python3.10/site-
packages/seaborn/distributions.py:500: FutureWarning: In a future version, the
Index constructor will not infer numeric dtypes when passed object-dtype
sequences (matching Series behavior)
  pd.Index(widths, name="widths"),
/home/isaac/miniconda3/envs/cse3380/lib/python3.10/site-
packages/seaborn/distributions.py:499: FutureWarning: In a future version, the
Index constructor will not infer numeric dtypes when passed object-dtype
sequences (matching Series behavior)
  pd.Index(edges, name="edges"),
/home/isaac/miniconda3/envs/cse3380/lib/python3.10/site-
packages/seaborn/distributions.py:500: FutureWarning: In a future version, the
Index constructor will not infer numeric dtypes when passed object-dtype
sequences (matching Series behavior)
  pd.Index(widths, name="widths"),
```

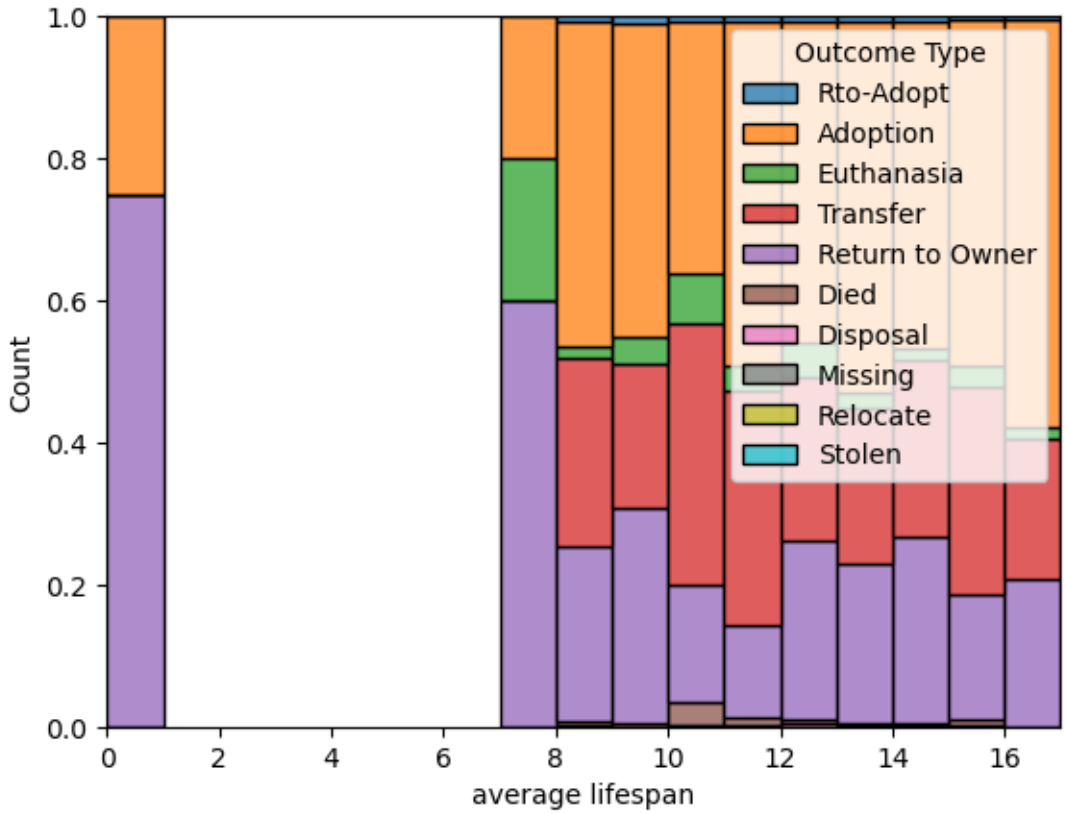



```
average lifespan ~ Outcome Type
```

```
/home/isaac/miniconda3/envs/cse3380/lib/python3.10/site-
packages/seaborn/distributions.py:499: FutureWarning: In a future version, the
Index constructor will not infer numeric dtypes when passed object-dtype
sequences (matching Series behavior)
  pd.Index(edges, name="edges"),
/home/isaac/miniconda3/envs/cse3380/lib/python3.10/site-
packages/seaborn/distributions.py:500: FutureWarning: In a future version, the
Index constructor will not infer numeric dtypes when passed object-dtype
sequences (matching Series behavior)
  pd.Index(widths, name="widths"),
/home/isaac/miniconda3/envs/cse3380/lib/python3.10/site-
packages/seaborn/distributions.py:499: FutureWarning: In a future version, the
Index constructor will not infer numeric dtypes when passed object-dtype
sequences (matching Series behavior)
  pd.Index(edges, name="edges"),
/home/isaac/miniconda3/envs/cse3380/lib/python3.10/site-
packages/seaborn/distributions.py:500: FutureWarning: In a future version, the
Index constructor will not infer numeric dtypes when passed object-dtype
sequences (matching Series behavior)
  pd.Index(widths, name="widths"),
```

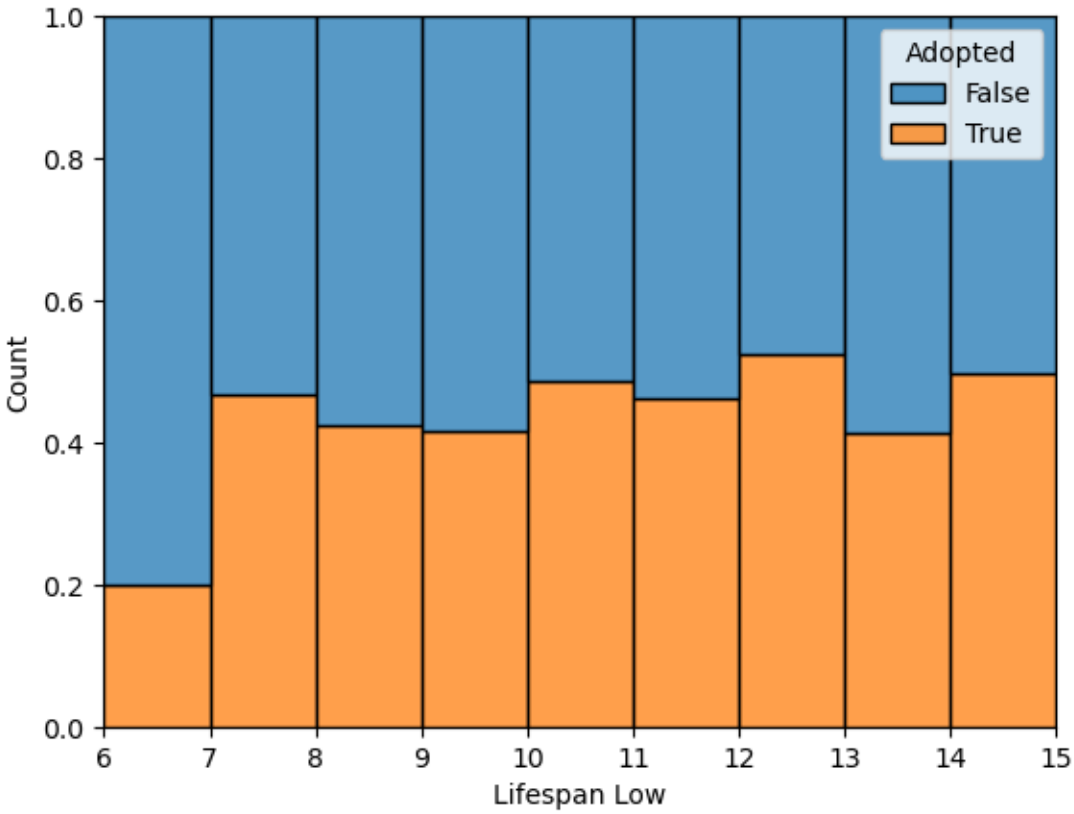
```
/home/isaac/miniconda3/envs/cse3380/lib/python3.10/site-
packages/seaborn/distributions.py:499: FutureWarning: In a future version, the
Index constructor will not infer numeric dtypes when passed object-dtype
sequences (matching Series behavior)
  pd.Index(edges, name="edges"),
/home/isaac/miniconda3/envs/cse3380/lib/python3.10/site-
packages/seaborn/distributions.py:500: FutureWarning: In a future version, the
Index constructor will not infer numeric dtypes when passed object-dtype
sequences (matching Series behavior)
  pd.Index(widths, name="widths"),
/home/isaac/miniconda3/envs/cse3380/lib/python3.10/site-
packages/seaborn/distributions.py:499: FutureWarning: In a future version, the
Index constructor will not infer numeric dtypes when passed object-dtype
sequences (matching Series behavior)
  pd.Index(edges, name="edges"),
/home/isaac/miniconda3/envs/cse3380/lib/python3.10/site-
packages/seaborn/distributions.py:500: FutureWarning: In a future version, the
Index constructor will not infer numeric dtypes when passed object-dtype
sequences (matching Series behavior)
  pd.Index(widths, name="widths"),
/home/isaac/miniconda3/envs/cse3380/lib/python3.10/site-
packages/seaborn/distributions.py:499: FutureWarning: In a future version, the
Index constructor will not infer numeric dtypes when passed object-dtype
sequences (matching Series behavior)
  pd.Index(edges, name="edges"),
/home/isaac/miniconda3/envs/cse3380/lib/python3.10/site-
packages/seaborn/distributions.py:500: FutureWarning: In a future version, the
Index constructor will not infer numeric dtypes when passed object-dtype
sequences (matching Series behavior)
  pd.Index(widths, name="widths"),
/home/isaac/miniconda3/envs/cse3380/lib/python3.10/site-
packages/seaborn/distributions.py:499: FutureWarning: In a future version, the
Index constructor will not infer numeric dtypes when passed object-dtype
sequences (matching Series behavior)
  pd.Index(edges, name="edges"),
/home/isaac/miniconda3/envs/cse3380/lib/python3.10/site-
packages/seaborn/distributions.py:500: FutureWarning: In a future version, the
Index constructor will not infer numeric dtypes when passed object-dtype
sequences (matching Series behavior)
  pd.Index(widths, name="widths"),
/home/isaac/miniconda3/envs/cse3380/lib/python3.10/site-
packages/seaborn/distributions.py:499: FutureWarning: In a future version, the
Index constructor will not infer numeric dtypes when passed object-dtype
sequences (matching Series behavior)
  pd.Index(edges, name="edges"),
/home/isaac/miniconda3/envs/cse3380/lib/python3.10/site-
packages/seaborn/distributions.py:500: FutureWarning: In a future version, the
Index constructor will not infer numeric dtypes when passed object-dtype
```

```
sequences (matching Series behavior)
  pd.Index(widths, name="widths"),
/home/isaac/miniconda3/envs/cse3380/lib/python3.10/site-
packages/seaborn/distributions.py:499: FutureWarning: In a future version, the
Index constructor will not infer numeric dtypes when passed object-dtype
sequences (matching Series behavior)
  pd.Index(edges, name="edges"),
/home/isaac/miniconda3/envs/cse3380/lib/python3.10/site-
packages/seaborn/distributions.py:500: FutureWarning: In a future version, the
Index constructor will not infer numeric dtypes when passed object-dtype
sequences (matching Series behavior)
  pd.Index(widths, name="widths"),
/home/isaac/miniconda3/envs/cse3380/lib/python3.10/site-
packages/seaborn/distributions.py:499: FutureWarning: In a future version, the
Index constructor will not infer numeric dtypes when passed object-dtype
sequences (matching Series behavior)
  pd.Index(edges, name="edges"),
/home/isaac/miniconda3/envs/cse3380/lib/python3.10/site-
packages/seaborn/distributions.py:500: FutureWarning: In a future version, the
Index constructor will not infer numeric dtypes when passed object-dtype
sequences (matching Series behavior)
  pd.Index(widths, name="widths"),
/home/isaac/miniconda3/envs/cse3380/lib/python3.10/site-
packages/seaborn/distributions.py:499: FutureWarning: In a future version, the
Index constructor will not infer numeric dtypes when passed object-dtype
sequences (matching Series behavior)
  pd.Index(edges, name="edges"),
/home/isaac/miniconda3/envs/cse3380/lib/python3.10/site-
packages/seaborn/distributions.py:500: FutureWarning: In a future version, the
Index constructor will not infer numeric dtypes when passed object-dtype
sequences (matching Series behavior)
  pd.Index(widths, name="widths"),
```



Lifespan Low ~ Adopted

```
/home/isaac/miniconda3/envs/cse3380/lib/python3.10/site-
packages/seaborn/distributions.py:499: FutureWarning: In a future version, the
Index constructor will not infer numeric dtypes when passed object-dtype
sequences (matching Series behavior)
  pd.Index(edges, name="edges"),
/home/isaac/miniconda3/envs/cse3380/lib/python3.10/site-
packages/seaborn/distributions.py:500: FutureWarning: In a future version, the
Index constructor will not infer numeric dtypes when passed object-dtype
sequences (matching Series behavior)
  pd.Index(widths, name="widths"),
/home/isaac/miniconda3/envs/cse3380/lib/python3.10/site-
packages/seaborn/distributions.py:499: FutureWarning: In a future version, the
Index constructor will not infer numeric dtypes when passed object-dtype
sequences (matching Series behavior)
  pd.Index(edges, name="edges"),
/home/isaac/miniconda3/envs/cse3380/lib/python3.10/site-
packages/seaborn/distributions.py:500: FutureWarning: In a future version, the
Index constructor will not infer numeric dtypes when passed object-dtype
sequences (matching Series behavior)
  pd.Index(widths, name="widths"),
```

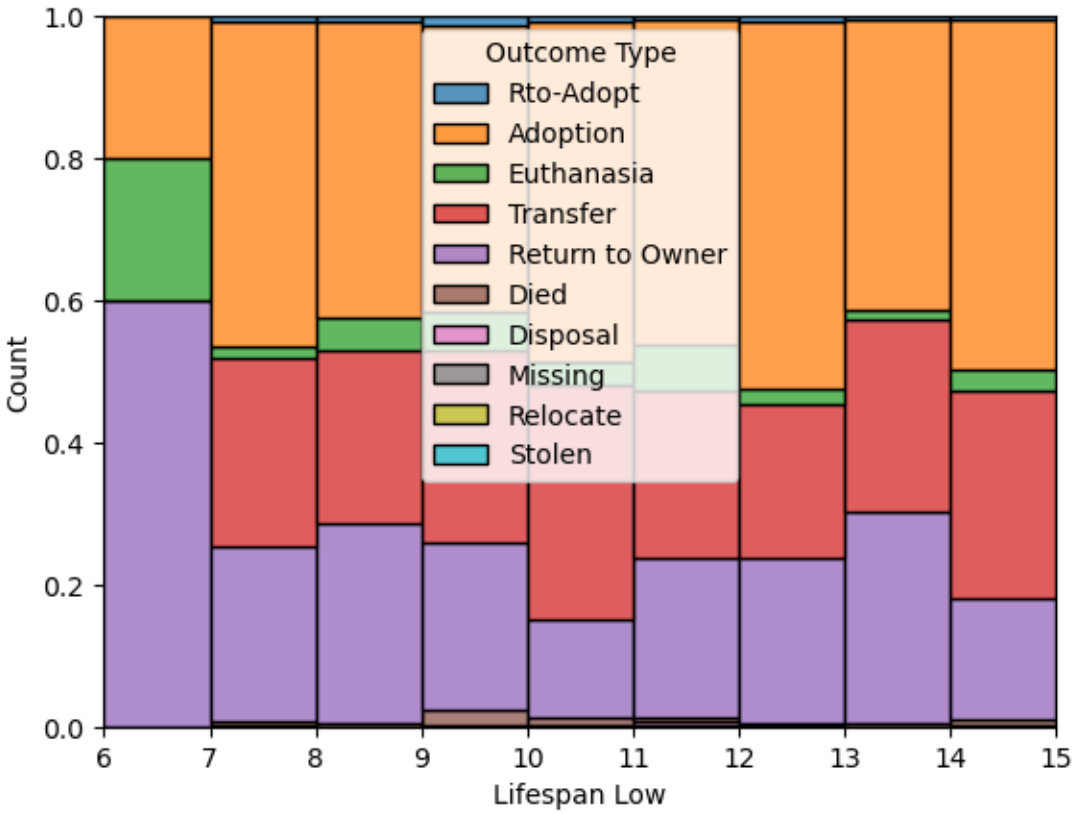


Lifespan Low ~ Outcome Type

```
/home/isaac/miniconda3/envs/cse3380/lib/python3.10/site-
packages/seaborn/distributions.py:499: FutureWarning: In a future version, the
Index constructor will not infer numeric dtypes when passed object-dtype
sequences (matching Series behavior)
  pd.Index(edges, name="edges"),
/home/isaac/miniconda3/envs/cse3380/lib/python3.10/site-
packages/seaborn/distributions.py:500: FutureWarning: In a future version, the
Index constructor will not infer numeric dtypes when passed object-dtype
sequences (matching Series behavior)
  pd.Index(widths, name="widths"),
/home/isaac/miniconda3/envs/cse3380/lib/python3.10/site-
packages/seaborn/distributions.py:499: FutureWarning: In a future version, the
Index constructor will not infer numeric dtypes when passed object-dtype
sequences (matching Series behavior)
  pd.Index(edges, name="edges"),
/home/isaac/miniconda3/envs/cse3380/lib/python3.10/site-
packages/seaborn/distributions.py:500: FutureWarning: In a future version, the
Index constructor will not infer numeric dtypes when passed object-dtype
sequences (matching Series behavior)
  pd.Index(widths, name="widths"),
```

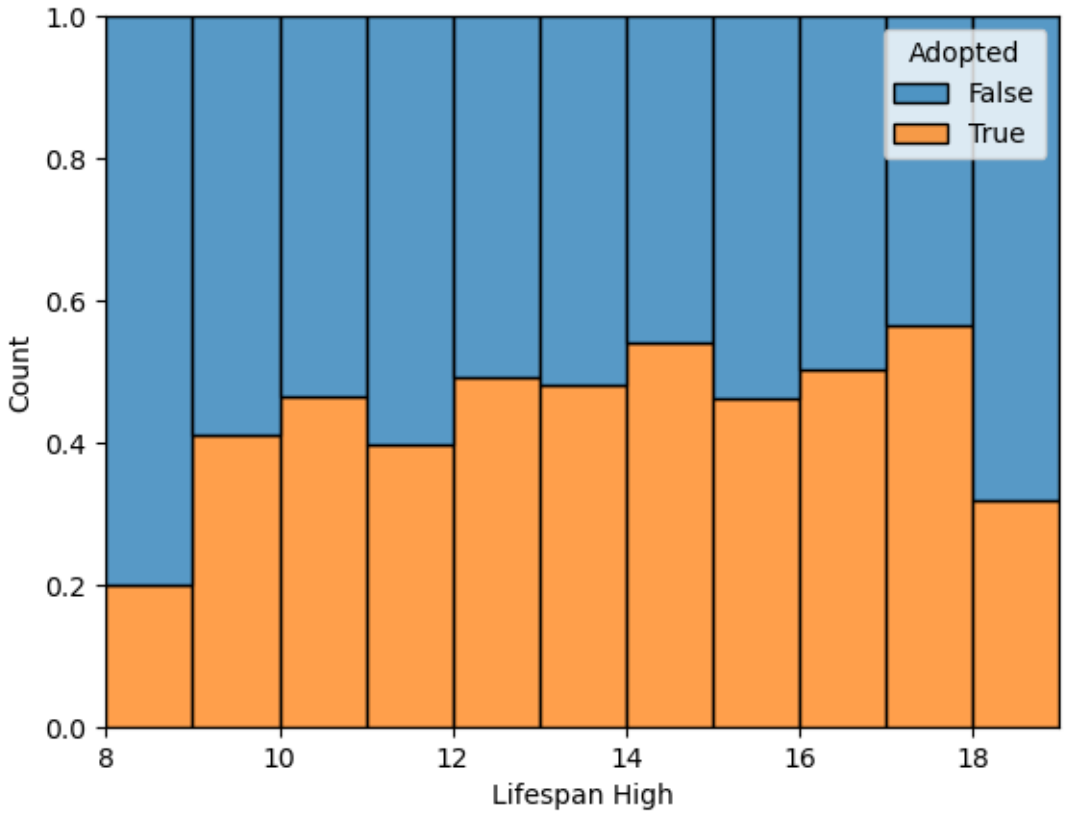
```
/home/isaac/miniconda3/envs/cse3380/lib/python3.10/site-
packages/seaborn/distributions.py:499: FutureWarning: In a future version, the
Index constructor will not infer numeric dtypes when passed object-dtype
sequences (matching Series behavior)
  pd.Index(edges, name="edges"),
/home/isaac/miniconda3/envs/cse3380/lib/python3.10/site-
packages/seaborn/distributions.py:500: FutureWarning: In a future version, the
Index constructor will not infer numeric dtypes when passed object-dtype
sequences (matching Series behavior)
  pd.Index(widths, name="widths"),
/home/isaac/miniconda3/envs/cse3380/lib/python3.10/site-
packages/seaborn/distributions.py:499: FutureWarning: In a future version, the
Index constructor will not infer numeric dtypes when passed object-dtype
sequences (matching Series behavior)
  pd.Index(edges, name="edges"),
/home/isaac/miniconda3/envs/cse3380/lib/python3.10/site-
packages/seaborn/distributions.py:500: FutureWarning: In a future version, the
Index constructor will not infer numeric dtypes when passed object-dtype
sequences (matching Series behavior)
  pd.Index(widths, name="widths"),
/home/isaac/miniconda3/envs/cse3380/lib/python3.10/site-
packages/seaborn/distributions.py:499: FutureWarning: In a future version, the
Index constructor will not infer numeric dtypes when passed object-dtype
sequences (matching Series behavior)
  pd.Index(edges, name="edges"),
/home/isaac/miniconda3/envs/cse3380/lib/python3.10/site-
packages/seaborn/distributions.py:500: FutureWarning: In a future version, the
Index constructor will not infer numeric dtypes when passed object-dtype
sequences (matching Series behavior)
  pd.Index(widths, name="widths"),
/home/isaac/miniconda3/envs/cse3380/lib/python3.10/site-
packages/seaborn/distributions.py:499: FutureWarning: In a future version, the
Index constructor will not infer numeric dtypes when passed object-dtype
sequences (matching Series behavior)
  pd.Index(edges, name="edges"),
/home/isaac/miniconda3/envs/cse3380/lib/python3.10/site-
packages/seaborn/distributions.py:500: FutureWarning: In a future version, the
Index constructor will not infer numeric dtypes when passed object-dtype
sequences (matching Series behavior)
  pd.Index(widths, name="widths"),
/home/isaac/miniconda3/envs/cse3380/lib/python3.10/site-
packages/seaborn/distributions.py:499: FutureWarning: In a future version, the
Index constructor will not infer numeric dtypes when passed object-dtype
sequences (matching Series behavior)
  pd.Index(edges, name="edges"),
/home/isaac/miniconda3/envs/cse3380/lib/python3.10/site-
packages/seaborn/distributions.py:500: FutureWarning: In a future version, the
Index constructor will not infer numeric dtypes when passed object-dtype
```

```
sequences (matching Series behavior)
  pd.Index(widths, name="widths"),
/home/isaac/miniconda3/envs/cse3380/lib/python3.10/site-
packages/seaborn/distributions.py:499: FutureWarning: In a future version, the
Index constructor will not infer numeric dtypes when passed object-dtype
sequences (matching Series behavior)
  pd.Index(edges, name="edges"),
/home/isaac/miniconda3/envs/cse3380/lib/python3.10/site-
packages/seaborn/distributions.py:500: FutureWarning: In a future version, the
Index constructor will not infer numeric dtypes when passed object-dtype
sequences (matching Series behavior)
  pd.Index(widths, name="widths"),
/home/isaac/miniconda3/envs/cse3380/lib/python3.10/site-
packages/seaborn/distributions.py:499: FutureWarning: In a future version, the
Index constructor will not infer numeric dtypes when passed object-dtype
sequences (matching Series behavior)
  pd.Index(edges, name="edges"),
/home/isaac/miniconda3/envs/cse3380/lib/python3.10/site-
packages/seaborn/distributions.py:500: FutureWarning: In a future version, the
Index constructor will not infer numeric dtypes when passed object-dtype
sequences (matching Series behavior)
  pd.Index(widths, name="widths"),
/home/isaac/miniconda3/envs/cse3380/lib/python3.10/site-
packages/seaborn/distributions.py:499: FutureWarning: In a future version, the
Index constructor will not infer numeric dtypes when passed object-dtype
sequences (matching Series behavior)
  pd.Index(edges, name="edges"),
/home/isaac/miniconda3/envs/cse3380/lib/python3.10/site-
packages/seaborn/distributions.py:500: FutureWarning: In a future version, the
Index constructor will not infer numeric dtypes when passed object-dtype
sequences (matching Series behavior)
  pd.Index(widths, name="widths"),
```



Lifespan High ~ Adopted

```
/home/isaac/miniconda3/envs/cse3380/lib/python3.10/site-
packages/seaborn/distributions.py:499: FutureWarning: In a future version, the
Index constructor will not infer numeric dtypes when passed object-dtype
sequences (matching Series behavior)
  pd.Index(edges, name="edges"),
/home/isaac/miniconda3/envs/cse3380/lib/python3.10/site-
packages/seaborn/distributions.py:500: FutureWarning: In a future version, the
Index constructor will not infer numeric dtypes when passed object-dtype
sequences (matching Series behavior)
  pd.Index(widths, name="widths"),
/home/isaac/miniconda3/envs/cse3380/lib/python3.10/site-
packages/seaborn/distributions.py:499: FutureWarning: In a future version, the
Index constructor will not infer numeric dtypes when passed object-dtype
sequences (matching Series behavior)
  pd.Index(edges, name="edges"),
/home/isaac/miniconda3/envs/cse3380/lib/python3.10/site-
packages/seaborn/distributions.py:500: FutureWarning: In a future version, the
Index constructor will not infer numeric dtypes when passed object-dtype
sequences (matching Series behavior)
  pd.Index(widths, name="widths"),
```

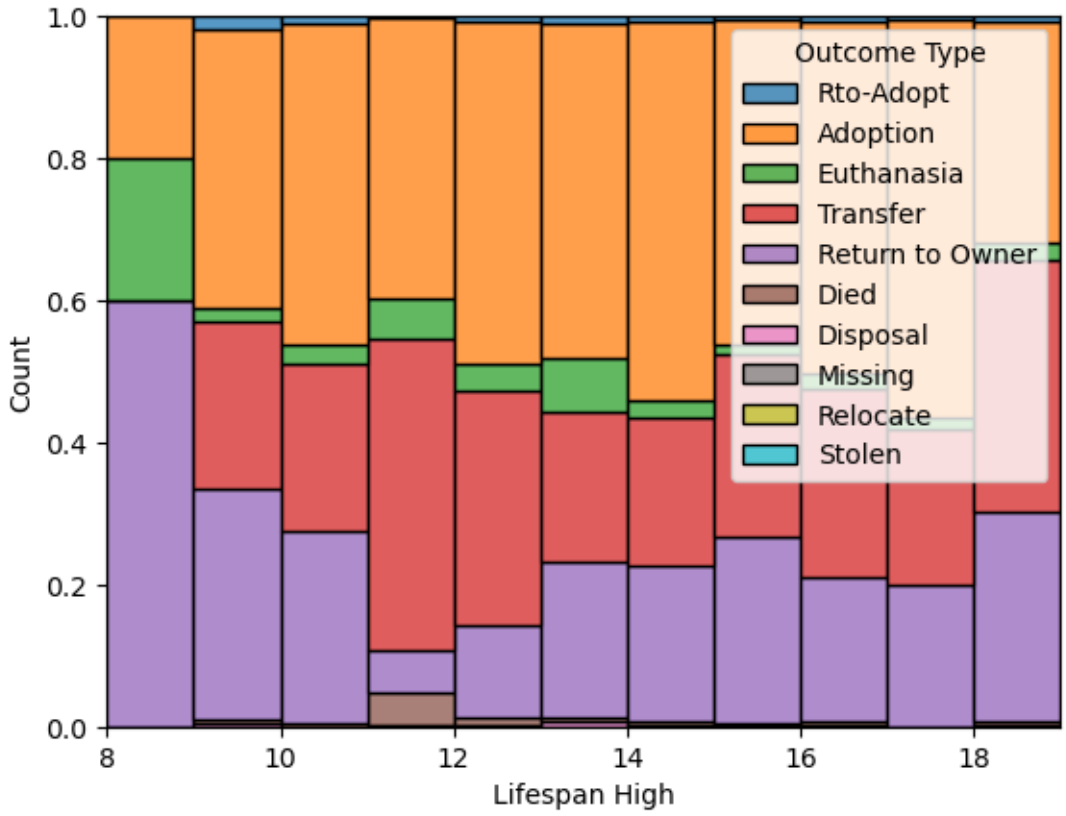


Lifespan High ~ Outcome Type

```
/home/isaac/miniconda3/envs/cse3380/lib/python3.10/site-
packages/seaborn/distributions.py:499: FutureWarning: In a future version, the
Index constructor will not infer numeric dtypes when passed object-dtype
sequences (matching Series behavior)
  pd.Index(edges, name="edges"),
/home/isaac/miniconda3/envs/cse3380/lib/python3.10/site-
packages/seaborn/distributions.py:500: FutureWarning: In a future version, the
Index constructor will not infer numeric dtypes when passed object-dtype
sequences (matching Series behavior)
  pd.Index(widths, name="widths"),
/home/isaac/miniconda3/envs/cse3380/lib/python3.10/site-
packages/seaborn/distributions.py:499: FutureWarning: In a future version, the
Index constructor will not infer numeric dtypes when passed object-dtype
sequences (matching Series behavior)
  pd.Index(edges, name="edges"),
/home/isaac/miniconda3/envs/cse3380/lib/python3.10/site-
packages/seaborn/distributions.py:500: FutureWarning: In a future version, the
Index constructor will not infer numeric dtypes when passed object-dtype
sequences (matching Series behavior)
  pd.Index(widths, name="widths"),
```

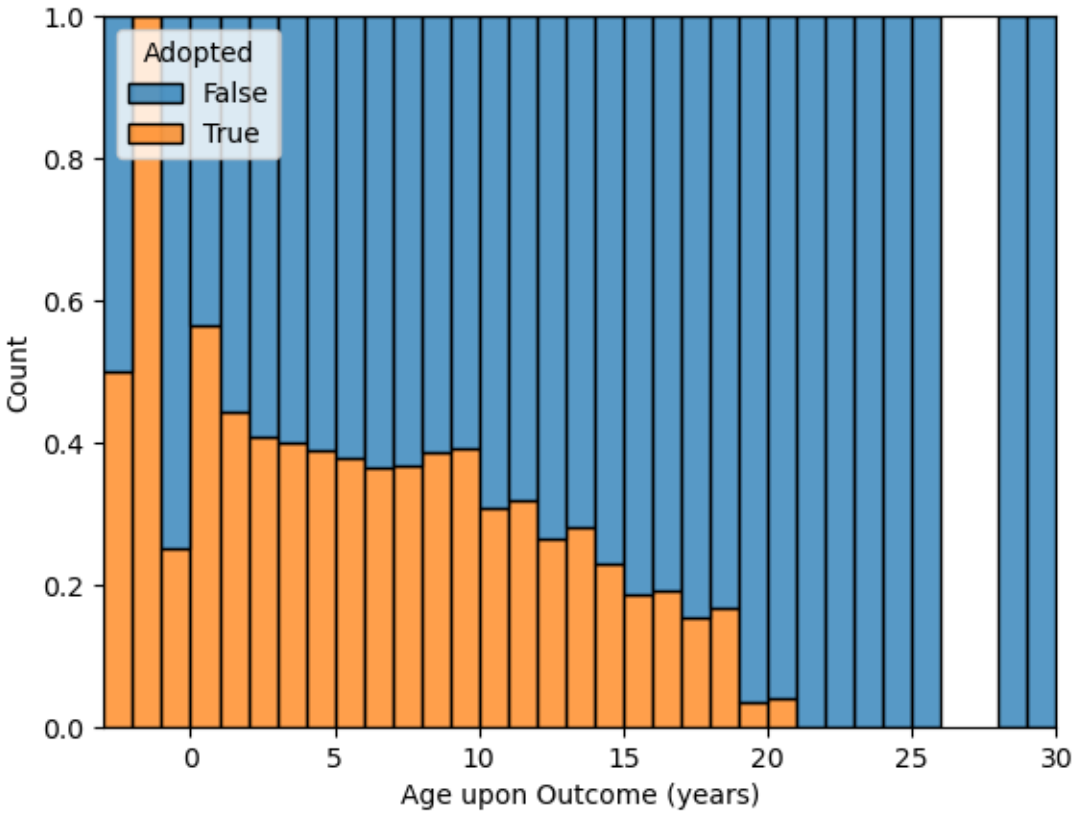
```
/home/isaac/miniconda3/envs/cse3380/lib/python3.10/site-
packages/seaborn/distributions.py:499: FutureWarning: In a future version, the
Index constructor will not infer numeric dtypes when passed object-dtype
sequences (matching Series behavior)
  pd.Index(edges, name="edges"),
/home/isaac/miniconda3/envs/cse3380/lib/python3.10/site-
packages/seaborn/distributions.py:500: FutureWarning: In a future version, the
Index constructor will not infer numeric dtypes when passed object-dtype
sequences (matching Series behavior)
  pd.Index(widths, name="widths"),
/home/isaac/miniconda3/envs/cse3380/lib/python3.10/site-
packages/seaborn/distributions.py:499: FutureWarning: In a future version, the
Index constructor will not infer numeric dtypes when passed object-dtype
sequences (matching Series behavior)
  pd.Index(edges, name="edges"),
/home/isaac/miniconda3/envs/cse3380/lib/python3.10/site-
packages/seaborn/distributions.py:500: FutureWarning: In a future version, the
Index constructor will not infer numeric dtypes when passed object-dtype
sequences (matching Series behavior)
  pd.Index(widths, name="widths"),
/home/isaac/miniconda3/envs/cse3380/lib/python3.10/site-
packages/seaborn/distributions.py:499: FutureWarning: In a future version, the
Index constructor will not infer numeric dtypes when passed object-dtype
sequences (matching Series behavior)
  pd.Index(edges, name="edges"),
/home/isaac/miniconda3/envs/cse3380/lib/python3.10/site-
packages/seaborn/distributions.py:500: FutureWarning: In a future version, the
Index constructor will not infer numeric dtypes when passed object-dtype
sequences (matching Series behavior)
  pd.Index(widths, name="widths"),
/home/isaac/miniconda3/envs/cse3380/lib/python3.10/site-
packages/seaborn/distributions.py:499: FutureWarning: In a future version, the
Index constructor will not infer numeric dtypes when passed object-dtype
sequences (matching Series behavior)
  pd.Index(edges, name="edges"),
/home/isaac/miniconda3/envs/cse3380/lib/python3.10/site-
packages/seaborn/distributions.py:500: FutureWarning: In a future version, the
Index constructor will not infer numeric dtypes when passed object-dtype
sequences (matching Series behavior)
  pd.Index(widths, name="widths"),
/home/isaac/miniconda3/envs/cse3380/lib/python3.10/site-
packages/seaborn/distributions.py:499: FutureWarning: In a future version, the
Index constructor will not infer numeric dtypes when passed object-dtype
sequences (matching Series behavior)
  pd.Index(edges, name="edges"),
/home/isaac/miniconda3/envs/cse3380/lib/python3.10/site-
packages/seaborn/distributions.py:500: FutureWarning: In a future version, the
Index constructor will not infer numeric dtypes when passed object-dtype
```

```
sequences (matching Series behavior)
  pd.Index(widths, name="widths"),
/home/isaac/miniconda3/envs/cse3380/lib/python3.10/site-
packages/seaborn/distributions.py:499: FutureWarning: In a future version, the
Index constructor will not infer numeric dtypes when passed object-dtype
sequences (matching Series behavior)
  pd.Index(edges, name="edges"),
/home/isaac/miniconda3/envs/cse3380/lib/python3.10/site-
packages/seaborn/distributions.py:500: FutureWarning: In a future version, the
Index constructor will not infer numeric dtypes when passed object-dtype
sequences (matching Series behavior)
  pd.Index(widths, name="widths"),
/home/isaac/miniconda3/envs/cse3380/lib/python3.10/site-
packages/seaborn/distributions.py:499: FutureWarning: In a future version, the
Index constructor will not infer numeric dtypes when passed object-dtype
sequences (matching Series behavior)
  pd.Index(edges, name="edges"),
/home/isaac/miniconda3/envs/cse3380/lib/python3.10/site-
packages/seaborn/distributions.py:500: FutureWarning: In a future version, the
Index constructor will not infer numeric dtypes when passed object-dtype
sequences (matching Series behavior)
  pd.Index(widths, name="widths"),
/home/isaac/miniconda3/envs/cse3380/lib/python3.10/site-
packages/seaborn/distributions.py:499: FutureWarning: In a future version, the
Index constructor will not infer numeric dtypes when passed object-dtype
sequences (matching Series behavior)
  pd.Index(edges, name="edges"),
/home/isaac/miniconda3/envs/cse3380/lib/python3.10/site-
packages/seaborn/distributions.py:500: FutureWarning: In a future version, the
Index constructor will not infer numeric dtypes when passed object-dtype
sequences (matching Series behavior)
  pd.Index(widths, name="widths"),
```



Age upon Outcome (years) ~ Adopted

```
/home/isaac/miniconda3/envs/cse3380/lib/python3.10/site-
packages/seaborn/distributions.py:499: FutureWarning: In a future version, the
Index constructor will not infer numeric dtypes when passed object-dtype
sequences (matching Series behavior)
  pd.Index(edges, name="edges"),
/home/isaac/miniconda3/envs/cse3380/lib/python3.10/site-
packages/seaborn/distributions.py:500: FutureWarning: In a future version, the
Index constructor will not infer numeric dtypes when passed object-dtype
sequences (matching Series behavior)
  pd.Index(widths, name="widths"),
/home/isaac/miniconda3/envs/cse3380/lib/python3.10/site-
packages/seaborn/distributions.py:499: FutureWarning: In a future version, the
Index constructor will not infer numeric dtypes when passed object-dtype
sequences (matching Series behavior)
  pd.Index(edges, name="edges"),
/home/isaac/miniconda3/envs/cse3380/lib/python3.10/site-
packages/seaborn/distributions.py:500: FutureWarning: In a future version, the
Index constructor will not infer numeric dtypes when passed object-dtype
sequences (matching Series behavior)
  pd.Index(widths, name="widths"),
```

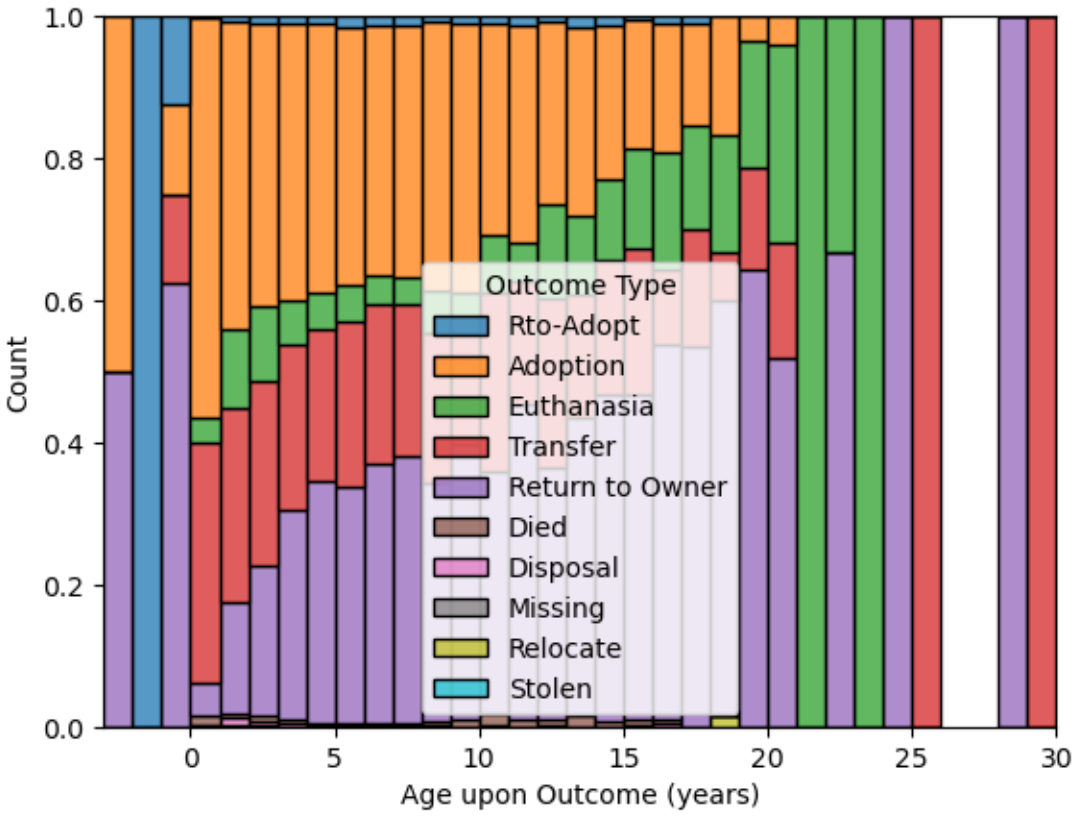


Age upon Outcome (years) ~ Outcome Type

```
/home/isaac/miniconda3/envs/cse3380/lib/python3.10/site-
packages/seaborn/distributions.py:499: FutureWarning: In a future version, the
Index constructor will not infer numeric dtypes when passed object-dtype
sequences (matching Series behavior)
  pd.Index(edges, name="edges"),
/home/isaac/miniconda3/envs/cse3380/lib/python3.10/site-
packages/seaborn/distributions.py:500: FutureWarning: In a future version, the
Index constructor will not infer numeric dtypes when passed object-dtype
sequences (matching Series behavior)
  pd.Index(widths, name="widths"),
/home/isaac/miniconda3/envs/cse3380/lib/python3.10/site-
packages/seaborn/distributions.py:499: FutureWarning: In a future version, the
Index constructor will not infer numeric dtypes when passed object-dtype
sequences (matching Series behavior)
  pd.Index(edges, name="edges"),
/home/isaac/miniconda3/envs/cse3380/lib/python3.10/site-
packages/seaborn/distributions.py:500: FutureWarning: In a future version, the
Index constructor will not infer numeric dtypes when passed object-dtype
sequences (matching Series behavior)
  pd.Index(widths, name="widths"),
```

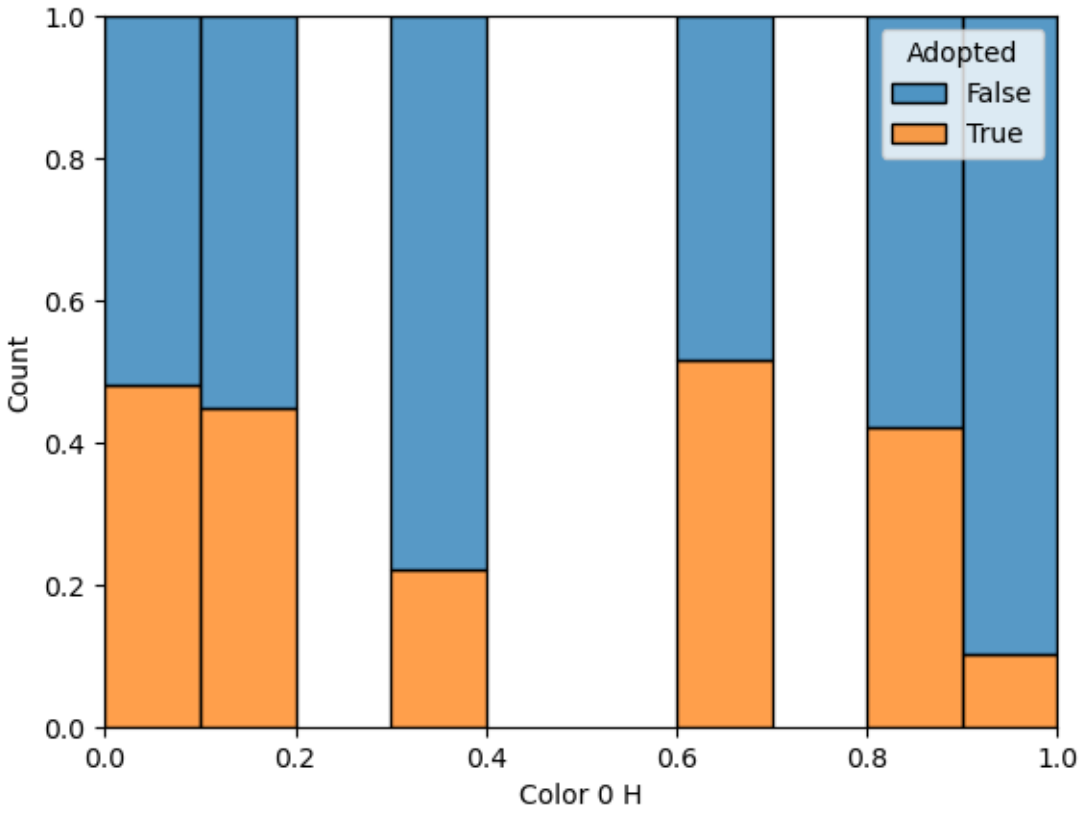
```
/home/isaac/miniconda3/envs/cse3380/lib/python3.10/site-
packages/seaborn/distributions.py:499: FutureWarning: In a future version, the
Index constructor will not infer numeric dtypes when passed object-dtype
sequences (matching Series behavior)
  pd.Index(edges, name="edges"),
/home/isaac/miniconda3/envs/cse3380/lib/python3.10/site-
packages/seaborn/distributions.py:500: FutureWarning: In a future version, the
Index constructor will not infer numeric dtypes when passed object-dtype
sequences (matching Series behavior)
  pd.Index(widths, name="widths"),
/home/isaac/miniconda3/envs/cse3380/lib/python3.10/site-
packages/seaborn/distributions.py:499: FutureWarning: In a future version, the
Index constructor will not infer numeric dtypes when passed object-dtype
sequences (matching Series behavior)
  pd.Index(edges, name="edges"),
/home/isaac/miniconda3/envs/cse3380/lib/python3.10/site-
packages/seaborn/distributions.py:500: FutureWarning: In a future version, the
Index constructor will not infer numeric dtypes when passed object-dtype
sequences (matching Series behavior)
  pd.Index(widths, name="widths"),
/home/isaac/miniconda3/envs/cse3380/lib/python3.10/site-
packages/seaborn/distributions.py:499: FutureWarning: In a future version, the
Index constructor will not infer numeric dtypes when passed object-dtype
sequences (matching Series behavior)
  pd.Index(edges, name="edges"),
/home/isaac/miniconda3/envs/cse3380/lib/python3.10/site-
packages/seaborn/distributions.py:500: FutureWarning: In a future version, the
Index constructor will not infer numeric dtypes when passed object-dtype
sequences (matching Series behavior)
  pd.Index(widths, name="widths"),
/home/isaac/miniconda3/envs/cse3380/lib/python3.10/site-
packages/seaborn/distributions.py:499: FutureWarning: In a future version, the
Index constructor will not infer numeric dtypes when passed object-dtype
sequences (matching Series behavior)
  pd.Index(edges, name="edges"),
/home/isaac/miniconda3/envs/cse3380/lib/python3.10/site-
packages/seaborn/distributions.py:500: FutureWarning: In a future version, the
Index constructor will not infer numeric dtypes when passed object-dtype
sequences (matching Series behavior)
  pd.Index(widths, name="widths"),
/home/isaac/miniconda3/envs/cse3380/lib/python3.10/site-
packages/seaborn/distributions.py:499: FutureWarning: In a future version, the
Index constructor will not infer numeric dtypes when passed object-dtype
sequences (matching Series behavior)
  pd.Index(edges, name="edges"),
/home/isaac/miniconda3/envs/cse3380/lib/python3.10/site-
packages/seaborn/distributions.py:500: FutureWarning: In a future version, the
Index constructor will not infer numeric dtypes when passed object-dtype
```

```
sequences (matching Series behavior)
  pd.Index(widths, name="widths"),
/home/isaac/miniconda3/envs/cse3380/lib/python3.10/site-
packages/seaborn/distributions.py:499: FutureWarning: In a future version, the
Index constructor will not infer numeric dtypes when passed object-dtype
sequences (matching Series behavior)
  pd.Index(edges, name="edges"),
/home/isaac/miniconda3/envs/cse3380/lib/python3.10/site-
packages/seaborn/distributions.py:500: FutureWarning: In a future version, the
Index constructor will not infer numeric dtypes when passed object-dtype
sequences (matching Series behavior)
  pd.Index(widths, name="widths"),
/home/isaac/miniconda3/envs/cse3380/lib/python3.10/site-
packages/seaborn/distributions.py:499: FutureWarning: In a future version, the
Index constructor will not infer numeric dtypes when passed object-dtype
sequences (matching Series behavior)
  pd.Index(edges, name="edges"),
/home/isaac/miniconda3/envs/cse3380/lib/python3.10/site-
packages/seaborn/distributions.py:500: FutureWarning: In a future version, the
Index constructor will not infer numeric dtypes when passed object-dtype
sequences (matching Series behavior)
  pd.Index(widths, name="widths"),
/home/isaac/miniconda3/envs/cse3380/lib/python3.10/site-
packages/seaborn/distributions.py:499: FutureWarning: In a future version, the
Index constructor will not infer numeric dtypes when passed object-dtype
sequences (matching Series behavior)
  pd.Index(edges, name="edges"),
/home/isaac/miniconda3/envs/cse3380/lib/python3.10/site-
packages/seaborn/distributions.py:500: FutureWarning: In a future version, the
Index constructor will not infer numeric dtypes when passed object-dtype
sequences (matching Series behavior)
  pd.Index(widths, name="widths"),
```




```
Color 0 H ~ Adopted
```

```
/home/isaac/miniconda3/envs/cse3380/lib/python3.10/site-
packages/seaborn/distributions.py:499: FutureWarning: In a future version, the
Index constructor will not infer numeric dtypes when passed object-dtype
sequences (matching Series behavior)
  pd.Index(edges, name="edges"),
/home/isaac/miniconda3/envs/cse3380/lib/python3.10/site-
packages/seaborn/distributions.py:500: FutureWarning: In a future version, the
Index constructor will not infer numeric dtypes when passed object-dtype
sequences (matching Series behavior)
  pd.Index(widths, name="widths"),
/home/isaac/miniconda3/envs/cse3380/lib/python3.10/site-
packages/seaborn/distributions.py:499: FutureWarning: In a future version, the
Index constructor will not infer numeric dtypes when passed object-dtype
sequences (matching Series behavior)
  pd.Index(edges, name="edges"),
/home/isaac/miniconda3/envs/cse3380/lib/python3.10/site-
packages/seaborn/distributions.py:500: FutureWarning: In a future version, the
Index constructor will not infer numeric dtypes when passed object-dtype
sequences (matching Series behavior)
  pd.Index(widths, name="widths"),
```

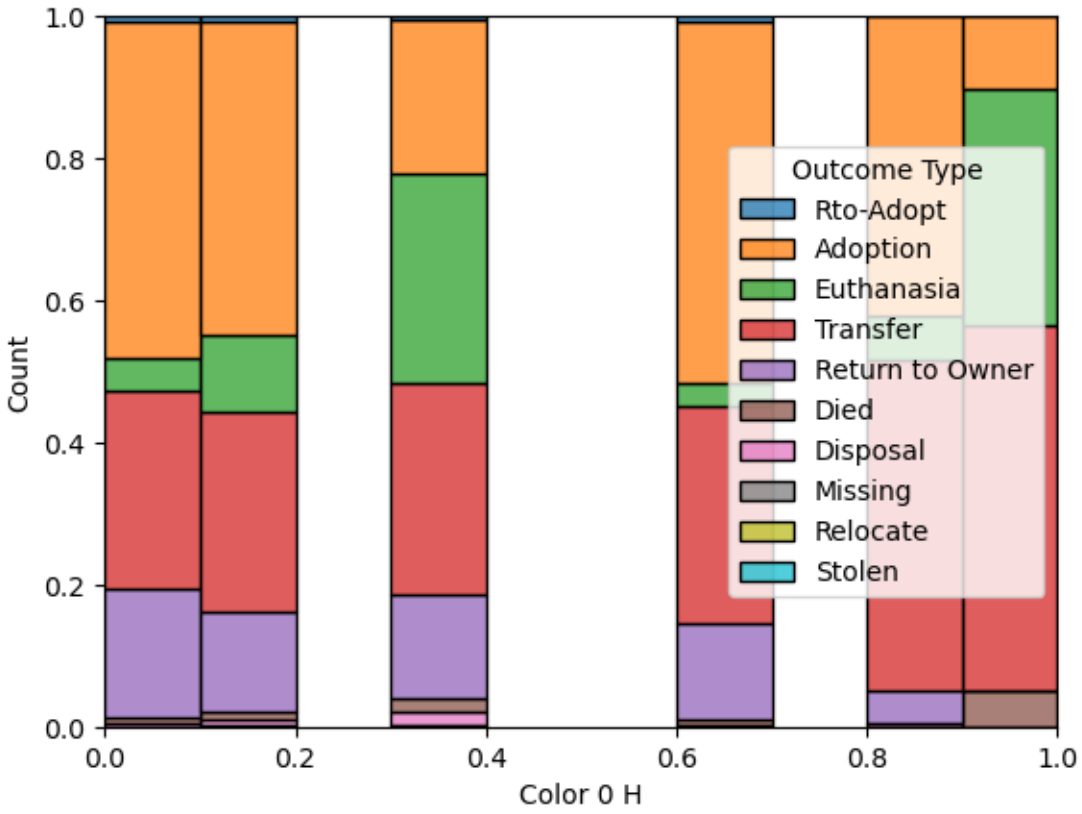


Color 0 H ~ Outcome Type

```
/home/isaac/miniconda3/envs/cse3380/lib/python3.10/site-
packages/seaborn/distributions.py:499: FutureWarning: In a future version, the
Index constructor will not infer numeric dtypes when passed object-dtype
sequences (matching Series behavior)
  pd.Index(edges, name="edges"),
/home/isaac/miniconda3/envs/cse3380/lib/python3.10/site-
packages/seaborn/distributions.py:500: FutureWarning: In a future version, the
Index constructor will not infer numeric dtypes when passed object-dtype
sequences (matching Series behavior)
  pd.Index(widths, name="widths"),
/home/isaac/miniconda3/envs/cse3380/lib/python3.10/site-
packages/seaborn/distributions.py:499: FutureWarning: In a future version, the
Index constructor will not infer numeric dtypes when passed object-dtype
sequences (matching Series behavior)
  pd.Index(edges, name="edges"),
/home/isaac/miniconda3/envs/cse3380/lib/python3.10/site-
packages/seaborn/distributions.py:500: FutureWarning: In a future version, the
Index constructor will not infer numeric dtypes when passed object-dtype
sequences (matching Series behavior)
  pd.Index(widths, name="widths"),
```

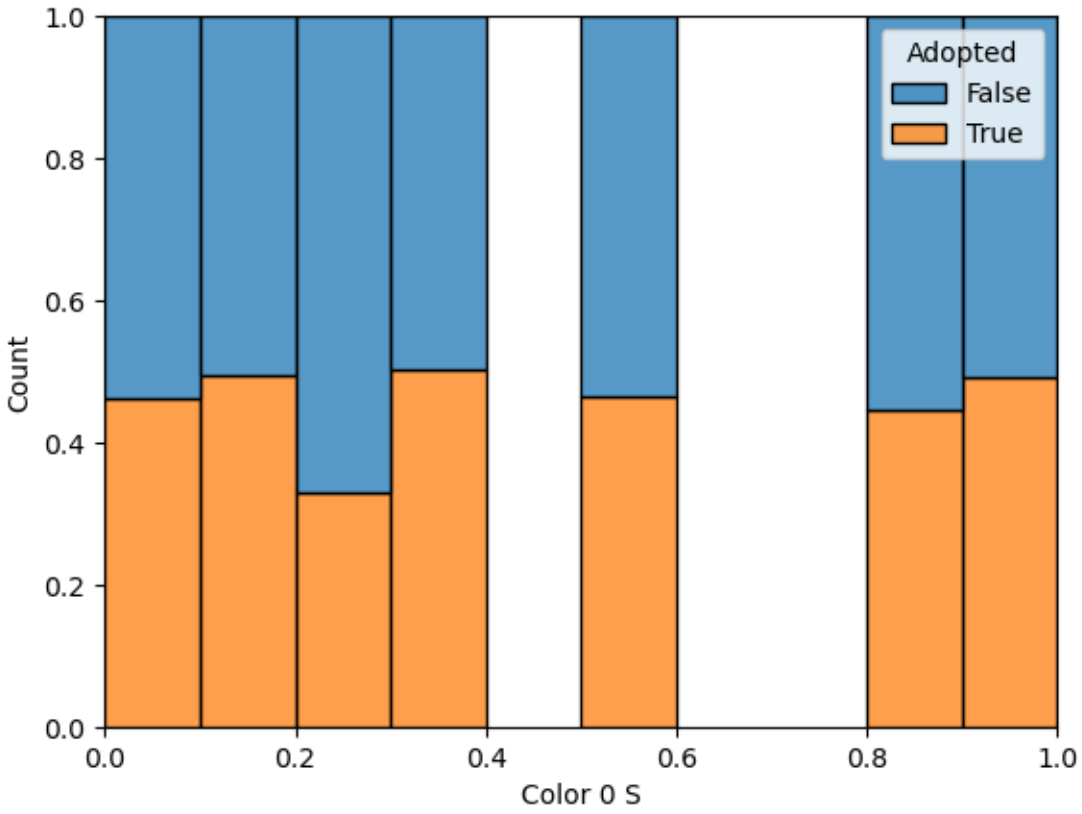
```
/home/isaac/miniconda3/envs/cse3380/lib/python3.10/site-
packages/seaborn/distributions.py:499: FutureWarning: In a future version, the
Index constructor will not infer numeric dtypes when passed object-dtype
sequences (matching Series behavior)
  pd.Index(edges, name="edges"),
/home/isaac/miniconda3/envs/cse3380/lib/python3.10/site-
packages/seaborn/distributions.py:500: FutureWarning: In a future version, the
Index constructor will not infer numeric dtypes when passed object-dtype
sequences (matching Series behavior)
  pd.Index(widths, name="widths"),
/home/isaac/miniconda3/envs/cse3380/lib/python3.10/site-
packages/seaborn/distributions.py:499: FutureWarning: In a future version, the
Index constructor will not infer numeric dtypes when passed object-dtype
sequences (matching Series behavior)
  pd.Index(edges, name="edges"),
/home/isaac/miniconda3/envs/cse3380/lib/python3.10/site-
packages/seaborn/distributions.py:500: FutureWarning: In a future version, the
Index constructor will not infer numeric dtypes when passed object-dtype
sequences (matching Series behavior)
  pd.Index(widths, name="widths"),
/home/isaac/miniconda3/envs/cse3380/lib/python3.10/site-
packages/seaborn/distributions.py:499: FutureWarning: In a future version, the
Index constructor will not infer numeric dtypes when passed object-dtype
sequences (matching Series behavior)
  pd.Index(edges, name="edges"),
/home/isaac/miniconda3/envs/cse3380/lib/python3.10/site-
packages/seaborn/distributions.py:500: FutureWarning: In a future version, the
Index constructor will not infer numeric dtypes when passed object-dtype
sequences (matching Series behavior)
  pd.Index(widths, name="widths"),
/home/isaac/miniconda3/envs/cse3380/lib/python3.10/site-
packages/seaborn/distributions.py:499: FutureWarning: In a future version, the
Index constructor will not infer numeric dtypes when passed object-dtype
sequences (matching Series behavior)
  pd.Index(edges, name="edges"),
/home/isaac/miniconda3/envs/cse3380/lib/python3.10/site-
packages/seaborn/distributions.py:500: FutureWarning: In a future version, the
Index constructor will not infer numeric dtypes when passed object-dtype
sequences (matching Series behavior)
  pd.Index(widths, name="widths"),
/home/isaac/miniconda3/envs/cse3380/lib/python3.10/site-
packages/seaborn/distributions.py:499: FutureWarning: In a future version, the
Index constructor will not infer numeric dtypes when passed object-dtype
sequences (matching Series behavior)
  pd.Index(edges, name="edges"),
/home/isaac/miniconda3/envs/cse3380/lib/python3.10/site-
packages/seaborn/distributions.py:500: FutureWarning: In a future version, the
Index constructor will not infer numeric dtypes when passed object-dtype
```

```
sequences (matching Series behavior)
  pd.Index(widths, name="widths"),
/home/isaac/miniconda3/envs/cse3380/lib/python3.10/site-
packages/seaborn/distributions.py:499: FutureWarning: In a future version, the
Index constructor will not infer numeric dtypes when passed object-dtype
sequences (matching Series behavior)
  pd.Index(edges, name="edges"),
/home/isaac/miniconda3/envs/cse3380/lib/python3.10/site-
packages/seaborn/distributions.py:500: FutureWarning: In a future version, the
Index constructor will not infer numeric dtypes when passed object-dtype
sequences (matching Series behavior)
  pd.Index(widths, name="widths"),
/home/isaac/miniconda3/envs/cse3380/lib/python3.10/site-
packages/seaborn/distributions.py:499: FutureWarning: In a future version, the
Index constructor will not infer numeric dtypes when passed object-dtype
sequences (matching Series behavior)
  pd.Index(edges, name="edges"),
/home/isaac/miniconda3/envs/cse3380/lib/python3.10/site-
packages/seaborn/distributions.py:500: FutureWarning: In a future version, the
Index constructor will not infer numeric dtypes when passed object-dtype
sequences (matching Series behavior)
  pd.Index(widths, name="widths"),
/home/isaac/miniconda3/envs/cse3380/lib/python3.10/site-
packages/seaborn/distributions.py:499: FutureWarning: In a future version, the
Index constructor will not infer numeric dtypes when passed object-dtype
sequences (matching Series behavior)
  pd.Index(edges, name="edges"),
/home/isaac/miniconda3/envs/cse3380/lib/python3.10/site-
packages/seaborn/distributions.py:500: FutureWarning: In a future version, the
Index constructor will not infer numeric dtypes when passed object-dtype
sequences (matching Series behavior)
  pd.Index(widths, name="widths"),
```



Color 0 S ~ Adopted

```
/home/isaac/miniconda3/envs/cse3380/lib/python3.10/site-
packages/seaborn/distributions.py:499: FutureWarning: In a future version, the
Index constructor will not infer numeric dtypes when passed object-dtype
sequences (matching Series behavior)
  pd.Index(edges, name="edges"),
/home/isaac/miniconda3/envs/cse3380/lib/python3.10/site-
packages/seaborn/distributions.py:500: FutureWarning: In a future version, the
Index constructor will not infer numeric dtypes when passed object-dtype
sequences (matching Series behavior)
  pd.Index(widths, name="widths"),
/home/isaac/miniconda3/envs/cse3380/lib/python3.10/site-
packages/seaborn/distributions.py:499: FutureWarning: In a future version, the
Index constructor will not infer numeric dtypes when passed object-dtype
sequences (matching Series behavior)
  pd.Index(edges, name="edges"),
/home/isaac/miniconda3/envs/cse3380/lib/python3.10/site-
packages/seaborn/distributions.py:500: FutureWarning: In a future version, the
Index constructor will not infer numeric dtypes when passed object-dtype
sequences (matching Series behavior)
  pd.Index(widths, name="widths"),
```

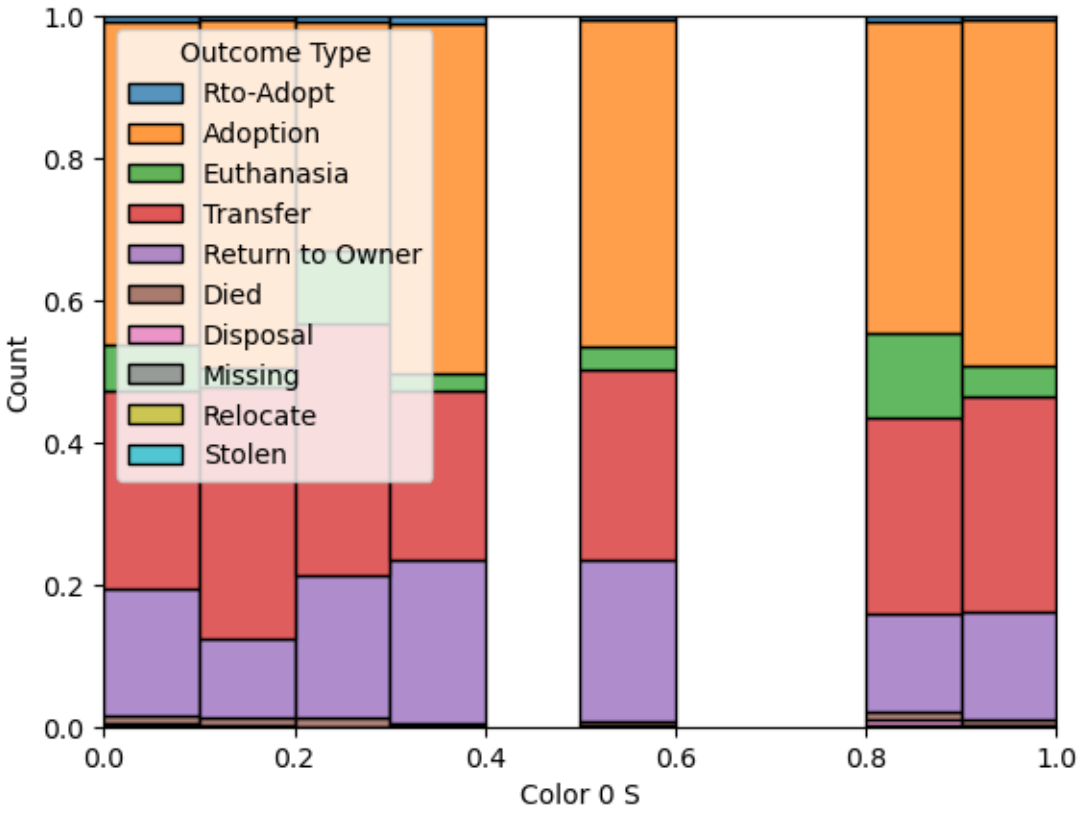


Color 0 S ~ Outcome Type

```
/home/isaac/miniconda3/envs/cse3380/lib/python3.10/site-
packages/seaborn/distributions.py:499: FutureWarning: In a future version, the
Index constructor will not infer numeric dtypes when passed object-dtype
sequences (matching Series behavior)
  pd.Index(edges, name="edges"),
/home/isaac/miniconda3/envs/cse3380/lib/python3.10/site-
packages/seaborn/distributions.py:500: FutureWarning: In a future version, the
Index constructor will not infer numeric dtypes when passed object-dtype
sequences (matching Series behavior)
  pd.Index(widths, name="widths"),
/home/isaac/miniconda3/envs/cse3380/lib/python3.10/site-
packages/seaborn/distributions.py:499: FutureWarning: In a future version, the
Index constructor will not infer numeric dtypes when passed object-dtype
sequences (matching Series behavior)
  pd.Index(edges, name="edges"),
/home/isaac/miniconda3/envs/cse3380/lib/python3.10/site-
packages/seaborn/distributions.py:500: FutureWarning: In a future version, the
Index constructor will not infer numeric dtypes when passed object-dtype
sequences (matching Series behavior)
  pd.Index(widths, name="widths"),
```

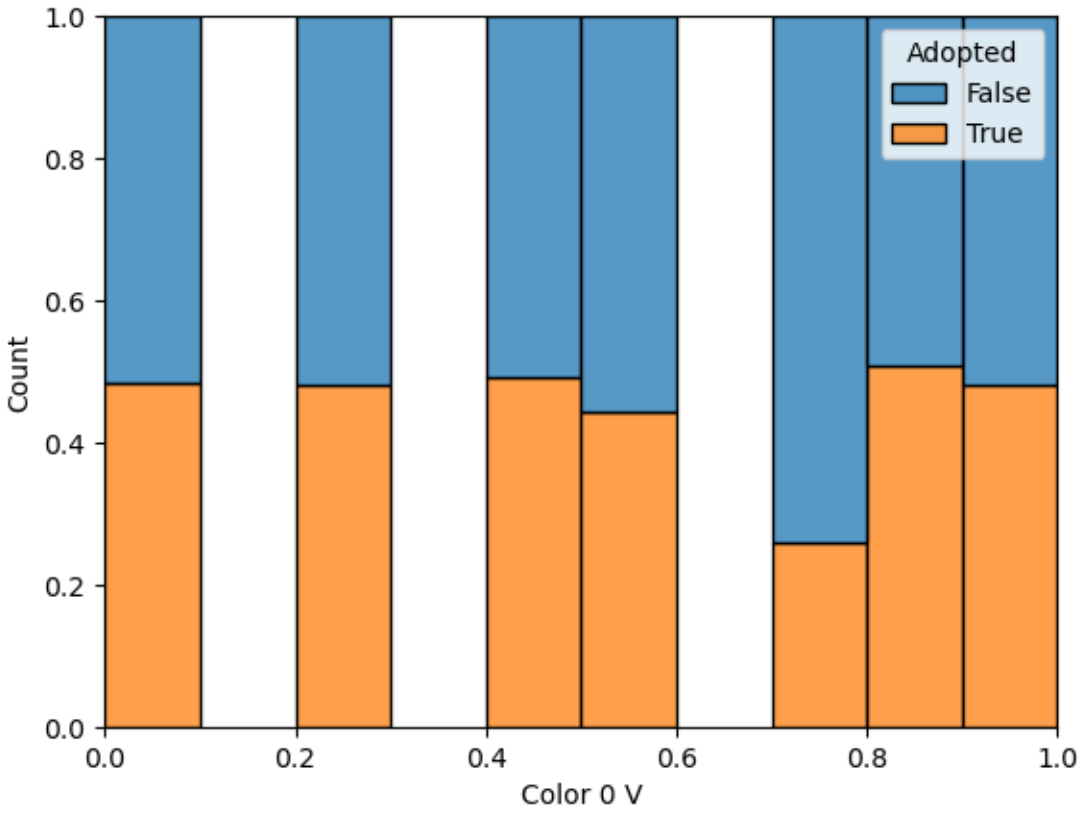
```
/home/isaac/miniconda3/envs/cse3380/lib/python3.10/site-
packages/seaborn/distributions.py:499: FutureWarning: In a future version, the
Index constructor will not infer numeric dtypes when passed object-dtype
sequences (matching Series behavior)
  pd.Index(edges, name="edges"),
/home/isaac/miniconda3/envs/cse3380/lib/python3.10/site-
packages/seaborn/distributions.py:500: FutureWarning: In a future version, the
Index constructor will not infer numeric dtypes when passed object-dtype
sequences (matching Series behavior)
  pd.Index(widths, name="widths"),
/home/isaac/miniconda3/envs/cse3380/lib/python3.10/site-
packages/seaborn/distributions.py:499: FutureWarning: In a future version, the
Index constructor will not infer numeric dtypes when passed object-dtype
sequences (matching Series behavior)
  pd.Index(edges, name="edges"),
/home/isaac/miniconda3/envs/cse3380/lib/python3.10/site-
packages/seaborn/distributions.py:500: FutureWarning: In a future version, the
Index constructor will not infer numeric dtypes when passed object-dtype
sequences (matching Series behavior)
  pd.Index(widths, name="widths"),
/home/isaac/miniconda3/envs/cse3380/lib/python3.10/site-
packages/seaborn/distributions.py:499: FutureWarning: In a future version, the
Index constructor will not infer numeric dtypes when passed object-dtype
sequences (matching Series behavior)
  pd.Index(edges, name="edges"),
/home/isaac/miniconda3/envs/cse3380/lib/python3.10/site-
packages/seaborn/distributions.py:500: FutureWarning: In a future version, the
Index constructor will not infer numeric dtypes when passed object-dtype
sequences (matching Series behavior)
  pd.Index(widths, name="widths"),
/home/isaac/miniconda3/envs/cse3380/lib/python3.10/site-
packages/seaborn/distributions.py:499: FutureWarning: In a future version, the
Index constructor will not infer numeric dtypes when passed object-dtype
sequences (matching Series behavior)
  pd.Index(edges, name="edges"),
/home/isaac/miniconda3/envs/cse3380/lib/python3.10/site-
packages/seaborn/distributions.py:500: FutureWarning: In a future version, the
Index constructor will not infer numeric dtypes when passed object-dtype
sequences (matching Series behavior)
  pd.Index(widths, name="widths"),
/home/isaac/miniconda3/envs/cse3380/lib/python3.10/site-
packages/seaborn/distributions.py:499: FutureWarning: In a future version, the
Index constructor will not infer numeric dtypes when passed object-dtype
sequences (matching Series behavior)
  pd.Index(edges, name="edges"),
/home/isaac/miniconda3/envs/cse3380/lib/python3.10/site-
packages/seaborn/distributions.py:500: FutureWarning: In a future version, the
Index constructor will not infer numeric dtypes when passed object-dtype
```

```
sequences (matching Series behavior)
  pd.Index(widths, name="widths"),
/home/isaac/miniconda3/envs/cse3380/lib/python3.10/site-
packages/seaborn/distributions.py:499: FutureWarning: In a future version, the
Index constructor will not infer numeric dtypes when passed object-dtype
sequences (matching Series behavior)
  pd.Index(edges, name="edges"),
/home/isaac/miniconda3/envs/cse3380/lib/python3.10/site-
packages/seaborn/distributions.py:500: FutureWarning: In a future version, the
Index constructor will not infer numeric dtypes when passed object-dtype
sequences (matching Series behavior)
  pd.Index(widths, name="widths"),
/home/isaac/miniconda3/envs/cse3380/lib/python3.10/site-
packages/seaborn/distributions.py:499: FutureWarning: In a future version, the
Index constructor will not infer numeric dtypes when passed object-dtype
sequences (matching Series behavior)
  pd.Index(edges, name="edges"),
/home/isaac/miniconda3/envs/cse3380/lib/python3.10/site-
packages/seaborn/distributions.py:500: FutureWarning: In a future version, the
Index constructor will not infer numeric dtypes when passed object-dtype
sequences (matching Series behavior)
  pd.Index(widths, name="widths"),
/home/isaac/miniconda3/envs/cse3380/lib/python3.10/site-
packages/seaborn/distributions.py:499: FutureWarning: In a future version, the
Index constructor will not infer numeric dtypes when passed object-dtype
sequences (matching Series behavior)
  pd.Index(edges, name="edges"),
/home/isaac/miniconda3/envs/cse3380/lib/python3.10/site-
packages/seaborn/distributions.py:500: FutureWarning: In a future version, the
Index constructor will not infer numeric dtypes when passed object-dtype
sequences (matching Series behavior)
  pd.Index(widths, name="widths"),
```



Color 0 V ~ Adopted

```
/home/isaac/miniconda3/envs/cse3380/lib/python3.10/site-
packages/seaborn/distributions.py:499: FutureWarning: In a future version, the
Index constructor will not infer numeric dtypes when passed object-dtype
sequences (matching Series behavior)
  pd.Index(edges, name="edges"),
/home/isaac/miniconda3/envs/cse3380/lib/python3.10/site-
packages/seaborn/distributions.py:500: FutureWarning: In a future version, the
Index constructor will not infer numeric dtypes when passed object-dtype
sequences (matching Series behavior)
  pd.Index(widths, name="widths"),
/home/isaac/miniconda3/envs/cse3380/lib/python3.10/site-
packages/seaborn/distributions.py:499: FutureWarning: In a future version, the
Index constructor will not infer numeric dtypes when passed object-dtype
sequences (matching Series behavior)
  pd.Index(edges, name="edges"),
/home/isaac/miniconda3/envs/cse3380/lib/python3.10/site-
packages/seaborn/distributions.py:500: FutureWarning: In a future version, the
Index constructor will not infer numeric dtypes when passed object-dtype
sequences (matching Series behavior)
  pd.Index(widths, name="widths"),
```

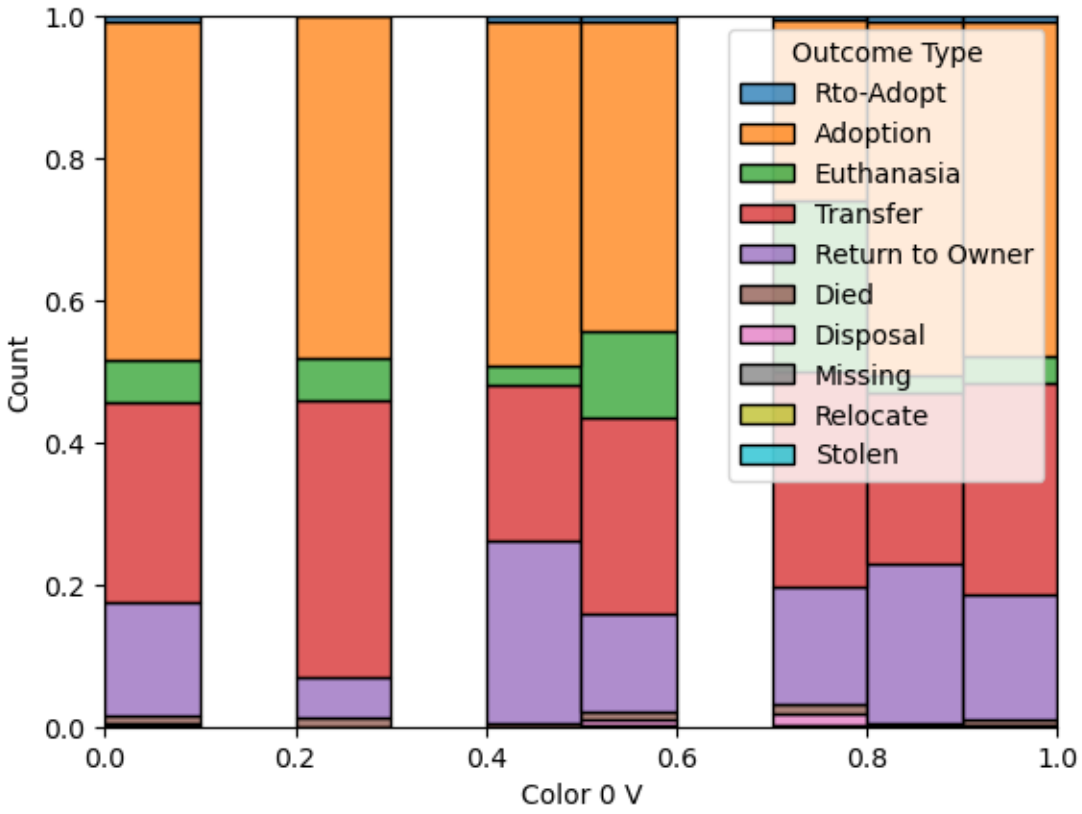


Color 0 V ~ Outcome Type

```
/home/isaac/miniconda3/envs/cse3380/lib/python3.10/site-
packages/seaborn/distributions.py:499: FutureWarning: In a future version, the
Index constructor will not infer numeric dtypes when passed object-dtype
sequences (matching Series behavior)
  pd.Index(edges, name="edges"),
/home/isaac/miniconda3/envs/cse3380/lib/python3.10/site-
packages/seaborn/distributions.py:500: FutureWarning: In a future version, the
Index constructor will not infer numeric dtypes when passed object-dtype
sequences (matching Series behavior)
  pd.Index(widths, name="widths"),
/home/isaac/miniconda3/envs/cse3380/lib/python3.10/site-
packages/seaborn/distributions.py:499: FutureWarning: In a future version, the
Index constructor will not infer numeric dtypes when passed object-dtype
sequences (matching Series behavior)
  pd.Index(edges, name="edges"),
/home/isaac/miniconda3/envs/cse3380/lib/python3.10/site-
packages/seaborn/distributions.py:500: FutureWarning: In a future version, the
Index constructor will not infer numeric dtypes when passed object-dtype
sequences (matching Series behavior)
  pd.Index(widths, name="widths"),
```

```
/home/isaac/miniconda3/envs/cse3380/lib/python3.10/site-
packages/seaborn/distributions.py:499: FutureWarning: In a future version, the
Index constructor will not infer numeric dtypes when passed object-dtype
sequences (matching Series behavior)
  pd.Index(edges, name="edges"),
/home/isaac/miniconda3/envs/cse3380/lib/python3.10/site-
packages/seaborn/distributions.py:500: FutureWarning: In a future version, the
Index constructor will not infer numeric dtypes when passed object-dtype
sequences (matching Series behavior)
  pd.Index(widths, name="widths"),
/home/isaac/miniconda3/envs/cse3380/lib/python3.10/site-
packages/seaborn/distributions.py:499: FutureWarning: In a future version, the
Index constructor will not infer numeric dtypes when passed object-dtype
sequences (matching Series behavior)
  pd.Index(edges, name="edges"),
/home/isaac/miniconda3/envs/cse3380/lib/python3.10/site-
packages/seaborn/distributions.py:500: FutureWarning: In a future version, the
Index constructor will not infer numeric dtypes when passed object-dtype
sequences (matching Series behavior)
  pd.Index(widths, name="widths"),
/home/isaac/miniconda3/envs/cse3380/lib/python3.10/site-
packages/seaborn/distributions.py:499: FutureWarning: In a future version, the
Index constructor will not infer numeric dtypes when passed object-dtype
sequences (matching Series behavior)
  pd.Index(edges, name="edges"),
/home/isaac/miniconda3/envs/cse3380/lib/python3.10/site-
packages/seaborn/distributions.py:500: FutureWarning: In a future version, the
Index constructor will not infer numeric dtypes when passed object-dtype
sequences (matching Series behavior)
  pd.Index(widths, name="widths"),
/home/isaac/miniconda3/envs/cse3380/lib/python3.10/site-
packages/seaborn/distributions.py:499: FutureWarning: In a future version, the
Index constructor will not infer numeric dtypes when passed object-dtype
sequences (matching Series behavior)
  pd.Index(edges, name="edges"),
/home/isaac/miniconda3/envs/cse3380/lib/python3.10/site-
packages/seaborn/distributions.py:500: FutureWarning: In a future version, the
Index constructor will not infer numeric dtypes when passed object-dtype
sequences (matching Series behavior)
  pd.Index(widths, name="widths"),
/home/isaac/miniconda3/envs/cse3380/lib/python3.10/site-
packages/seaborn/distributions.py:499: FutureWarning: In a future version, the
Index constructor will not infer numeric dtypes when passed object-dtype
sequences (matching Series behavior)
  pd.Index(edges, name="edges"),
/home/isaac/miniconda3/envs/cse3380/lib/python3.10/site-
packages/seaborn/distributions.py:500: FutureWarning: In a future version, the
Index constructor will not infer numeric dtypes when passed object-dtype
```

```
sequences (matching Series behavior)
  pd.Index(widths, name="widths"),
/home/isaac/miniconda3/envs/cse3380/lib/python3.10/site-
packages/seaborn/distributions.py:499: FutureWarning: In a future version, the
Index constructor will not infer numeric dtypes when passed object-dtype
sequences (matching Series behavior)
  pd.Index(edges, name="edges"),
/home/isaac/miniconda3/envs/cse3380/lib/python3.10/site-
packages/seaborn/distributions.py:500: FutureWarning: In a future version, the
Index constructor will not infer numeric dtypes when passed object-dtype
sequences (matching Series behavior)
  pd.Index(widths, name="widths"),
/home/isaac/miniconda3/envs/cse3380/lib/python3.10/site-
packages/seaborn/distributions.py:499: FutureWarning: In a future version, the
Index constructor will not infer numeric dtypes when passed object-dtype
sequences (matching Series behavior)
  pd.Index(edges, name="edges"),
/home/isaac/miniconda3/envs/cse3380/lib/python3.10/site-
packages/seaborn/distributions.py:500: FutureWarning: In a future version, the
Index constructor will not infer numeric dtypes when passed object-dtype
sequences (matching Series behavior)
  pd.Index(widths, name="widths"),
/home/isaac/miniconda3/envs/cse3380/lib/python3.10/site-
packages/seaborn/distributions.py:499: FutureWarning: In a future version, the
Index constructor will not infer numeric dtypes when passed object-dtype
sequences (matching Series behavior)
  pd.Index(edges, name="edges"),
/home/isaac/miniconda3/envs/cse3380/lib/python3.10/site-
packages/seaborn/distributions.py:500: FutureWarning: In a future version, the
Index constructor will not infer numeric dtypes when passed object-dtype
sequences (matching Series behavior)
  pd.Index(widths, name="widths"),
```



3.3 Name

This section will attempt to look for correlations between the name of animals and their outcome.

[36]:
```
# %pip install tensorflow
# %pip install tensorflow_hub

# # NOTE: when I ran this, it said:
# # "Note: you may need to restart the kernel to use updated packages."
```

[37]:
```
# # adapted from TensorFlow tutorial
# # https://www.tensorflow.org/hub/tutorials/
 ↪semantic_similarity_with_tf_hub_universal_encoder

# import tensorflow as tf
# import tensorflow_hub as hub
# import os
# import re

# module_url = "https://tfhub.dev/google/universal-sentence-encoder/4"
# model = hub.load(module_url)
```

```
# print ("module %s loaded" % module_url)
# def embed(input):
#   return model(input)
```

[ ]: