final_project

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1 Final Project

2 Exploratory data analysis of the Disney datasets

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3 Introduction

3.1 Question(s) of interests

In this analysis, I will be investigating a question associated with the collection of Disney datasets. I am interested in finding which animation director creates the most revenue gross for Disney. It is interesting because Disney is one of the most successful animation movie productions companies, and we can find some clues of how the animation industry changes over the years. We all know people have different tastes in the arts, especially the movies, but the economic benefits of a movie are straightforward.

My favourite Disney director is **Byron Howard**. He directed the Zootopia, which won the 2016 Oscar and is also my favourite Disney animation. Although Howard is an amazing director, he is more an animator but a director for many years. This means that Howard hasn't directed a lot of movies yet. In order to make a more reasonable guess, I did some research and found a "Top Animation Directors Ever" list.

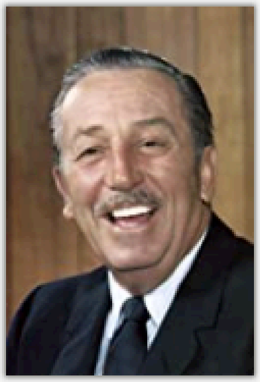
Top Animation Directors Ever

by khfjjujk | created - 14 Aug 2013 | updated - 10 Jun 2015 | Public

10 names

Sort by: List Order

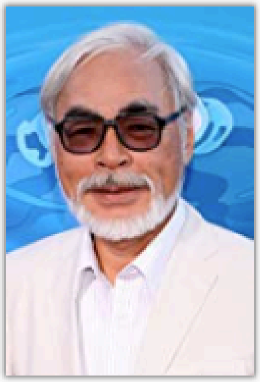
View:



1. **Walt Disney**

Snow White and the Seven Dwarfs

Walter Elias Disney was born on December 5, 1901 in Chicago, Illinois, the son of Flora Disney (née Call) and Elias Disney, a Canadian-born farmer and businessperson. He had Irish, German, and English ancestry. Walt moved with his parents to Kansas City at age seven, where he spent the majority of ...



2. **Hayao Miyazaki**

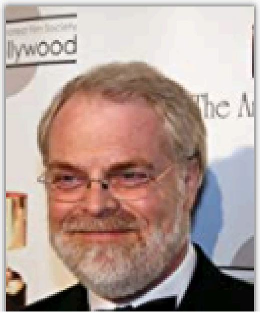
Director | Sen to Chihiro no kamikakushi

Hayao Miyazaki is one of Japan's greatest animation directors. The entertaining plots, compelling characters, and breathtaking animation in his films have earned him international renown from critics as well as public recognition within Japan. The Walt Disney Company's commitment to introduce the ...

3. **John Lasseter**

Writer | Toy Story 2

Although born in Hollywood John and his twin sister, Johanna were raised in Wittier near Los Angeles. His parents were Jewell Mae (Risley), an art teacher, and Paul Eual Lasseter, a parts manager at a Chevrolet dealership. His mother's profession contributed to his interest in animation and ...



4. **Ron Clements**

Writer | Hercules

Ron Clements was born on April 25, 1953 in Sioux City, Iowa, USA as Ronald Francis Clements. He is a writer and director, known for Hercules (1997), Aladdin (1992) and The Princess and the Frog (2009). He has been married to Tamara Lee Glumace since February 25, 1989.

The first is "Walt Disney", who is great but we can not count him because he is all the Disney movies producer. The second and third are "Hayao Miyazaki" and "John Lasseter", who are fabulous but not Disney director. The fourth is "Ron Clements" who directs "The Little Mermaid", "Hercules", "The Princess and the Frog" etc. and yes, a Disney director. Therefore, I would expect **Ron Clements** to be the animation director who creates the most revenue gross for Disney.

3.2 Dataset description

The below descripitions were taken directly from the website where the datasets were obtained.

"Disney characters, box office success & annual gross income" "What are the trends in the Walt Disney Studio's box office data? How do certain characters contribute to the success or failure of a movie?"

The Disney dataset is composed of 5 tables, `disney_movies_total_gross.csv`, `disney_revenue_1991-2016.csv`, `disney-characters.csv`, `disney-director.csv`, and `disney-voice-actors.csv`. Each table is stored in a `.csv` file and contains different information about Disney movies including its revenue, directors, release date, characters, and voice actors. I will be using the `disney_movies_total_gross` and `disney-director` tables formally described below:

- **disney__movies__total__gross.csv**
  - Disney movie box office gross and inflation adjustments.
- **disney-director.csv**
  - Only scraped the first director's name of each animation film.

4 Methods and Results

Since Disney produces not only animation but also real actors' movies, I will need to clean the **disney__movies__total__gross** because I am only interested in animation directors. This means I will only consider the movies listed in **disney-director**.

However, before moving further, let us import the tables and do some basic visualizations.

[1]:
```python
# Lets import all the required libraries needed for this analysis
import altair as alt
import pandas as pd

# import all the required files
gross = pd.read_csv("data/disney_movies_total_gross.csv")
directors = pd.read_csv("data/disney-director.csv")
```

Let's see what the tables look like.

[2]:
```python
gross.head()
```

[2]:
```
                        movie_title  release_date      genre MPAA_rating  \
0  Snow White and the Seven Dwarfs  Dec 21, 1937    Musical           G
1                        Pinocchio   Feb 9, 1940  Adventure           G
2                         Fantasia  Nov 13, 1940    Musical           G
```

```
3                Song of the South  Nov 12, 1946  Adventure           G
4                       Cinderella  Feb 15, 1950      Drama           G

   total_gross inflation_adjusted_gross
0  $184,925,485           $5,228,953,251
1   $84,300,000           $2,188,229,052
2   $83,320,000           $2,187,090,808
3   $65,000,000           $1,078,510,579
4   $85,000,000             $920,608,730
```

[3]:
```
directors.head()
```

[3]:
```
                              name        director
0  Snow White and the Seven Dwarfs      David Hand
1                        Pinocchio  Ben Sharpsteen
2                         Fantasia    full credits
3                            Dumbo  Ben Sharpsteen
4                            Bambi      David Hand
```

Let's get some other information about the **gross** table.

[4]:
```
gross.info()
```

```
<class 'pandas.core.frame.DataFrame'>
RangeIndex: 579 entries, 0 to 578
Data columns (total 6 columns):
 #   Column                    Non-Null Count  Dtype
---  ------                    --------------  -----
 0   movie_title               579 non-null    object
 1   release_date              579 non-null    object
 2   genre                     562 non-null    object
 3   MPAA_rating               523 non-null    object
 4   total_gross               579 non-null    object
 5   inflation_adjusted_gross  579 non-null    object
dtypes: object(6)
memory usage: 27.3+ KB
```

The **gross** table has 579 rows and 6 columns. Every **movie_title** has a **release_date**, the number of its **total_gross** in the release year, and the number of **inflation_adjusted_gross**, which adjust the revenue regarding to the 2016 value. The **genre** and the **MPAA_rating** have some missing entries, but they do not relate to our analysis.

Let's get some other information about the **directors** table.

[5]:
```
directors.info()
```

```
<class 'pandas.core.frame.DataFrame'>
RangeIndex: 56 entries, 0 to 55
Data columns (total 2 columns):
 #   Column    Non-Null Count  Dtype
---  ------    --------------  -----
 0   name      56 non-null     object
 1   director  56 non-null     object
dtypes: object(2)
memory usage: 1.0+ KB
```

The **directors** table has 56 rows with 2 columns. Every movie has a **name**, and a **director**.

As a first visualization, lets look at the gross ranking of Disney movies from 1937 to 2016 regarding the 2016 adjusted value. To do this, I will use the **gross** table.

[6]:
```
#covert the currency $ string in the "totall_gross" and␣
↪"inflation_adjusted_gross" to float
gross[gross.columns[4:]] = gross[gross.columns[4:]].replace('[\$,]', '',␣
↪regex=True).astype(float)

#sort the gross value based on the "inflation_adjusted_gross"
gross_rank = gross.sort_values(by="inflation_adjusted_gross",ascending=False)

#Reset the index so we can plot using altair
gross_rank = gross_rank.reset_index(drop=True)
gross_rank.head(10)
```

[6]:
```
                              movie_title  release_date      genre MPAA_rating  \
0         Snow White and the Seven Dwarfs  Dec 21, 1937    Musical           G
1                               Pinocchio   Feb 9, 1940  Adventure           G
2                                Fantasia  Nov 13, 1940    Musical           G
3                          101 Dalmatians  Jan 25, 1961     Comedy           G
4                      Lady and the Tramp  Jun 22, 1955      Drama           G
5                       Song of the South  Nov 12, 1946  Adventure           G
6  Star Wars Ep. VII: The Force Awakens  Dec 18, 2015  Adventure       PG-13
7                              Cinderella  Feb 15, 1950      Drama           G
8                         The Jungle Book  Oct 18, 1967    Musical   Not Rated
9                           The Lion King  Jun 15, 1994  Adventure           G

   total_gross  inflation_adjusted_gross
0  184925485.0              5.228953e+09
1   84300000.0              2.188229e+09
2   83320000.0              2.187091e+09
3  153000000.0              1.362871e+09
4   93600000.0              1.236036e+09
5   65000000.0              1.078511e+09
6  936662225.0              9.366622e+08
7   85000000.0              9.206087e+08
8  141843000.0              7.896123e+08
9  422780140.0              7.616409e+08
```

Now that we have it in the proper format, we can generate a bar plot to visualize it.

[7]:
```
# Use altair to generate a bar plot
gross_rank_plot = (
    alt.Chart(gross_rank, width=7000, height=300)
    .mark_bar(size=10)
    .encode(
        x=alt.X("movie_title:N", title="Disney Movie"),
        y=alt.Y("inflation_adjusted_gross:Q", title="Gross Value (adjusted up␣
↪to 2016)"),
    )
    .properties(title="Gross Ranking of Disney Movies from 1937 to 2016")
)
gross_rank_plot
```

[7]:
```
alt.Chart(…)
```

From this plot, we know that the top 5 animation is “Snow White and the Seven Dwarfs”, “Pinocchio”, “Fantasia”, “101 Dalmatians”, and “Lady and the Tramp”. It looks like they are all from the last century almost 70 years ago. Also, this plot is long and messy. In this case, I think I need to take a deeper look at the **gross** data more about its time.

Let’s create a second visualization of the yearly gross value of Disney movies. Before doing that, I need to get the year value separately for every movie and rearrange the columns we need.

[8]:
```
#get the year, month, day separately of each movie
dates = (gross['release_date'].str.split(' ', expand=True).rename(columns = {0:
↪'month',
                                                                              1:'day',
                                                                              2:'year'}))


dates
```

[8]:
```
    month  day  year
0     Dec  21,  1937
1     Feb   9,  1940
2     Nov  13,  1940
3     Nov  12,  1946
4     Feb  15,  1950
..    …    …     …
574   Sep   2,  2016
575   Sep  23,  2016
576   Nov   4,  2016
577   Nov  23,  2016
578   Dec  16,  2016

[579 rows x 3 columns]
```

[9]:
```
#assign the seperate year to the gross DataFrame
gross_year = gross.assign(year = dates['year'].astype(int))

#rearrange the gross_year columns
gross_year = gross_year.loc[:, ['year', 'movie_title', 'total_gross',␣
 ↪'inflation_adjusted_gross']]
gross_year
```

[9]:
```
     year                       movie_title  total_gross  \
0    1937  Snow White and the Seven Dwarfs  184925485.0
1    1940                        Pinocchio   84300000.0
2    1940                         Fantasia   83320000.0
3    1946                Song of the South   65000000.0
4    1950                       Cinderella   85000000.0
..    …                               …           …
574  2016         The Light Between Oceans   12545979.0
575  2016                  Queen of Katwe    8874389.0
576  2016                   Doctor Strange  232532923.0
577  2016                            Moana  246082029.0
578  2016     Rogue One: A Star Wars Story  529483936.0

     inflation_adjusted_gross
0                5.228953e+09
1                2.188229e+09
2                2.187091e+09
3                1.078511e+09
4                9.206087e+08
..                        …
574              1.254598e+07
575              8.874389e+06
576              2.325329e+08
577              2.460820e+08
578              5.294839e+08

[579 rows x 4 columns]
```

Now, let's group by 'year' and count the total number of the 'inflation_adjusted_gross' and sort it in a descending way. To do this, I will import and use the script I created with a custom function that takes in a data frame and groups it by a certain column and then sort it by the values we interest.

[10]:
```
# import the custom script
import script as ps

# run it on the data
gross_year_group = ps.custom_sort(gross_year,'year','inflation_adjusted_gross')
gross_year_group
```

```
[10]:     year  inflation_adjusted_gross
      0   1937              5.228953e+09
      1   1940              4.375320e+09
      2   2016              2.873393e+09
      3   2015              2.495663e+09
      4   1998              2.189031e+09
      5   1995              2.188599e+09
      6   2003              2.171245e+09
      7   1996              2.157239e+09
      8   1994              2.140691e+09
      9   1999              1.981583e+09
      10  2013              1.887864e+09
      11  2006              1.834745e+09
      12  1961              1.797807e+09
      13  2007              1.757480e+09
      14  1992              1.736350e+09
      15  2000              1.711676e+09
      16  2002              1.680600e+09
      17  2010              1.622535e+09
      18  2004              1.570219e+09
      19  2014              1.560791e+09
      20  2012              1.537669e+09
      21  1997              1.474848e+09
      22  1993              1.427313e+09
      23  2009              1.359909e+09
      24  2001              1.296292e+09
      25  2005              1.273983e+09
      26  1955              1.236036e+09
      27  1990              1.226461e+09
      28  1991              1.221190e+09
      29  1987              1.186650e+09
      30  2011              1.172579e+09
      31  2008              1.135356e+09
      32  1989              1.097851e+09
      33  1946              1.078511e+09
      34  1988              9.868419e+08
      35  1950              9.206087e+08
      36  1967              7.896123e+08
      37  1986              5.774724e+08
      38  1954              5.282800e+08
      39  1977              3.636592e+08
      40  1970              3.563622e+08
      41  1981              1.816369e+08
      42  1984              1.781327e+08
      43  1985              1.731242e+08
      44  1963              1.538708e+08
      45  1968              1.386127e+08
```

```
46  1975                1.312469e+08
47  1979                1.203774e+08
48  1982                1.107312e+08
49  1962                1.095816e+08
50  1983                1.005495e+08
51  1971                9.130545e+07
52  1980                4.356021e+07
53  1959                2.150583e+07
```

Now that we have reasonable yearly values in the proper format, we can generate a bar plot to visualize it.

[11]:
```
# Use altair to generate a bar plot
gross_year_plot = (
    alt.Chart(gross_year_group, width=700, height=300)
    .mark_bar()
    .encode(
        x=alt.X("year:Q", title="Year"),
        y=alt.Y("inflation_adjusted_gross:Q", title="Gross Value(adjusted up to␣
 ↪2016)"),
    )
    .properties(title="Total Gross Revenue of Disney Movies from 1937 to 2016")
)
gross_year_plot
```

[11]:
```
alt.Chart(...)
```

From the above plot, we can see the historical development of Disney. In 1937 and 1940, Disney made its highest value achievement. Then it slows down and creates one animation almost every 5 years. Since 1980, Disney started to create movies every year and get a high number gross every 3 – 4 years. Generally, the number keeps growing from 1980 and doubles quickly in 1987. It reaches its first peak around 1995 and decreases slightly from 2000 to 2012. After that, the number increases again and reaches the third-highest gross in Disney history in 2016. This plot gives me more confidence in recent 30 years animations.

As a third visualization, let's take a look at the number of animations directed by every director. To do this, I will use **directors** DataFrame.

Now let's group by 'director' name and count the frequency of the animation 'name'.

[12]:
```
# group by director and count the frequency of movies
animation_with_directors_group = pd.DataFrame(directors.
 ↪groupby('director')['name'].count())

# Reset the index so we can plot using altair
animation_with_directors_group = animation_with_directors_group.reset_index()
animation_with_directors_group
```

```
[12]:              director  name
      0           Art Stevens     1
      1            Barry Cook     1
      2        Ben Sharpsteen     2
      3          Byron Howard     1
      4            Chris Buck     2
      5         Chris Sanders     1
      6        Chris Williams     1
      7        Clyde Geronimi     3
      8            David Hand     2
      9              Don Hall     1
      10       Gary Trousdale     3
      11      George Scribner     1
      12       Hamilton Luske     2
      13          Jack Kinney     4
      14          Mark Dindal     2
      15         Mike Gabriel     2
      16         Nathan Greno     1
      17      Norman Ferguson     1
      18         Ralph Zondag     1
      19           Rich Moore     1
      20        Robert Walker     1
      21         Roger Allers     1
      22         Ron Clements     7
      23   Stephen J. Anderson     2
      24           Ted Berman     1
      25      Wilfred Jackson     1
      26            Will Finn     1
      27  Wolfgang Reitherman     7
      28         full credits     2
```

Let's do a scatter plot of the directors with the most animations.

```
[13]: directors_plot = (
          alt.Chart(animation_with_directors_group, width=500, height=300)
          .mark_circle()
          .encode(
              x=alt.X("director:O", sort="y", title="Disney directors"),
              y=alt.Y("name:Q", title="Numbers of animations"),
          )
          .properties(title="Numbers of animations directed by Disney directors")
      )
      directors_plot
```

```
[13]: alt.Chart(…)
```

It seems that both our expectation **Ron Clements**, and a director **Wolfgang Reitherman**, who directed "101 Dalmatians", "The Jungle Books" etc. have created 7 animations. What a fierce competition!

Now, it is time to answer our original questions. First, I need to change the column "name" in **directors** to "movie_title" to match the **gross** for merging the data.

[14]:
```
# change the column name to match
directors = directors.rename({'name': 'movie_title'}, axis=1)
directors
```

[14]:
```
                               movie_title             director
0          Snow White and the Seven Dwarfs           David Hand
1                                Pinocchio       Ben Sharpsteen
2                                 Fantasia         full credits
3                                    Dumbo       Ben Sharpsteen
4                                    Bambi           David Hand
5                           Saludos Amigos          Jack Kinney
6                       The Three Caballeros      Norman Ferguson
7                          Make Mine Music          Jack Kinney
8                        Fun and Fancy Free          Jack Kinney
9                              Melody Time       Clyde Geronimi
10  The Adventures of Ichabod and Mr. Toad          Jack Kinney
11                              Cinderella      Wilfred Jackson
12                      Alice in Wonderland       Clyde Geronimi
13                               Peter Pan       Hamilton Luske
14                      Lady and the Tramp       Hamilton Luske
15                         Sleeping Beauty       Clyde Geronimi
16                          101 Dalmatians  Wolfgang Reitherman
17                  The Sword in the Stone  Wolfgang Reitherman
18                         The Jungle Book  Wolfgang Reitherman
19                          The Aristocats  Wolfgang Reitherman
20                              Robin Hood  Wolfgang Reitherman
21  The Many Adventures of Winnie the Pooh  Wolfgang Reitherman
22                            The Rescuers  Wolfgang Reitherman
23                   The Fox and the Hound          Art Stevens
24                      The Black Cauldron           Ted Berman
25             The Great Mouse Detective         Ron Clements
26                        Oliver & Company      George Scribner
27                       The Little Mermaid         Ron Clements
28                  The Rescuers Down Under         Mike Gabriel
29                    Beauty and the Beast       Gary Trousdale
30                                 Aladdin         Ron Clements
31                           The Lion King        Roger Allers
32                              Pocahontas         Mike Gabriel
33              The Hunchback of Notre Dame       Gary Trousdale
34                                Hercules         Ron Clements
35                                   Mulan           Barry Cook
36                                  Tarzan           Chris Buck
37                           Fantasia 2000         full credits
```

```
38                           Dinosaur        Ralph Zondag
39              The Emperor's New Groove        Mark Dindal
40              Atlantis: The Lost Empire   Gary Trousdale
41                       Lilo & Stitch     Chris Sanders
42                     Treasure Planet      Ron Clements
43                        Brother Bear     Robert Walker
44                   Home on the Range         Will Finn
45                      Chicken Little       Mark Dindal
46                  Meet the Robinsons  Stephen J. Anderson
47                                Bolt     Chris Williams
48             The Princess and the Frog     Ron Clements
49                             Tangled      Nathan Greno
50                     Winnie the Pooh  Stephen J. Anderson
51                        Wreck-It Ralph       Rich Moore
52                              Frozen        Chris Buck
53                          Big Hero 6          Don Hall
54                            Zootopia      Byron Howard
55                               Moana      Ron Clements
```

Ok, let's merge it with the **gross** dataframe and we will only focus on the movies listed in **directors** since we want the animation directors.

[15]:
```
directors_gross_merged = pd.merge(gross, directors, on="movie_title")
directors_gross_merged
```

[15]:
```
                          movie_title  release_date      genre  \
0         Snow White and the Seven Dwarfs  Dec 21, 1937    Musical
1                              Pinocchio   Feb 9, 1940  Adventure
2                               Fantasia  Nov 13, 1940    Musical
3                             Cinderella  Feb 15, 1950      Drama
4                             Cinderella  Mar 13, 2015      Drama
5                     Lady and the Tramp  Jun 22, 1955      Drama
6                        Sleeping Beauty  Jan 29, 1959      Drama
7                         101 Dalmatians  Jan 25, 1961     Comedy
8                         101 Dalmatians  Nov 27, 1996     Comedy
9                   The Sword in the Stone  Dec 25, 1963  Adventure
10                       The Jungle Book  Oct 18, 1967    Musical
11                       The Jungle Book  Dec 25, 1994  Adventure
12                       The Jungle Book  Apr 15, 2016  Adventure
13                        The Aristocats  Apr 24, 1970    Musical
14  The Many Adventures of Winnie the Pooh  Mar 11, 1977        NaN
15                         The Rescuers  Jun 22, 1977  Adventure
16                   The Fox and the Hound  Jul 10, 1981     Comedy
17                    The Black Cauldron  Jul 24, 1985  Adventure
18              The Great Mouse Detective   Jul 2, 1986  Adventure
19                     Oliver & Company  Nov 18, 1988  Adventure
20                     The Little Mermaid  Nov 15, 1989  Adventure
```

```
21             The Rescuers Down Under  Nov 16, 1990  Adventure
22                Beauty and the Beast  Nov 13, 1991    Musical
23                             Aladdin  Nov 11, 1992     Comedy
24                       The Lion King  Jun 15, 1994  Adventure
25                          Pocahontas  Jun 10, 1995  Adventure
26          The Hunchback of Notre Dame  Jun 21, 1996  Adventure
27                            Hercules  Jun 13, 1997  Adventure
28                               Mulan  Jun 19, 1998  Adventure
29                              Tarzan  Jun 16, 1999  Adventure
30                            Dinosaur  May 19, 2000  Adventure
31              The Emperor's New Groove  Dec 15, 2000  Adventure
32              Atlantis: The Lost Empire   Jun 8, 2001  Adventure
33                        Lilo & Stitch  Jun 21, 2002  Adventure
34                      Treasure Planet  Nov 27, 2002  Adventure
35                         Brother Bear  Oct 24, 2003  Adventure
36                    Home on the Range   Apr 2, 2004     Comedy
37                       Chicken Little   Nov 4, 2005  Adventure
38                   Meet the Robinsons  Mar 30, 2007  Adventure
39                                 Bolt  Nov 21, 2008     Comedy
40             The Princess and the Frog  Nov 25, 2009  Adventure
41                   Alice in Wonderland   Mar 5, 2010  Adventure
42                              Tangled  Nov 24, 2010  Adventure
43                      Winnie the Pooh  Jul 15, 2011  Adventure
44                       Wreck-It Ralph   Nov 2, 2012  Adventure
45                               Frozen  Nov 22, 2013  Adventure
46                           Big Hero 6   Nov 7, 2014  Adventure
47                             Zootopia   Mar 4, 2016  Adventure
48                                Moana  Nov 23, 2016  Adventure

   MPAA_rating  total_gross  inflation_adjusted_gross            director
0            G  184925485.0              5.228953e+09          David Hand
1            G   84300000.0              2.188229e+09      Ben Sharpsteen
2            G   83320000.0              2.187091e+09        full credits
3            G   85000000.0              9.206087e+08     Wilfred Jackson
4           PG  201151353.0              2.011514e+08     Wilfred Jackson
5            G   93600000.0              1.236036e+09      Hamilton Luske
6          NaN    9464608.0              2.150583e+07      Clyde Geronimi
7            G  153000000.0              1.362871e+09  Wolfgang Reitherman
8            G  136189294.0              2.587289e+08  Wolfgang Reitherman
9          NaN   22182353.0              1.538708e+08  Wolfgang Reitherman
10   Not Rated  141843000.0              7.896123e+08  Wolfgang Reitherman
11          PG   44342956.0              8.893032e+07  Wolfgang Reitherman
12          PG  364001123.0              3.640011e+08  Wolfgang Reitherman
13           G   55675257.0              2.551615e+08  Wolfgang Reitherman
14         NaN          0.0              0.000000e+00  Wolfgang Reitherman
15         NaN   48775599.0              1.597439e+08  Wolfgang Reitherman
16         NaN   43899231.0              1.331189e+08          Art Stevens
```

```
17        NaN   21288692.0             5.055314e+07          Ted Berman
18        NaN   23605534.0             5.363737e+07        Ron Clements
19          G   49576671.0             1.022545e+08     George Scribner
20          G  111543479.0             2.237260e+08        Ron Clements
21          G   27931461.0             5.579673e+07        Mike Gabriel
22          G  218951625.0             3.630177e+08      Gary Trousdale
23          G  217350219.0             4.419692e+08        Ron Clements
24          G  422780140.0             7.616409e+08        Roger Allers
25          G  141579773.0             2.743710e+08        Mike Gabriel
26          G  100138851.0             1.909888e+08      Gary Trousdale
27          G   99112101.0             1.820294e+08        Ron Clements
28          G  120620254.0             2.168078e+08          Barry Cook
29          G  171091819.0             2.839003e+08          Chris Buck
30         PG  137748063.0             2.154390e+08        Ralph Zondag
31          G   89296573.0             1.367893e+08         Mark Dindal
32         PG   84052762.0             1.251881e+08      Gary Trousdale
33         PG  145771527.0             2.115067e+08       Chris Sanders
34         PG   38120554.0             5.518914e+07        Ron Clements
35          G   85336277.0             1.192183e+08       Robert Walker
36         PG   50026353.0             6.791017e+07           Will Finn
37          G  135386665.0             1.779547e+08         Mark Dindal
38          G   97822171.0             1.198606e+08  Stephen J. Anderson
39         PG  114053759.0             1.337025e+08      Chris Williams
40          G  104400899.0             1.163165e+08        Ron Clements
41         PG  334191110.0             3.570635e+08      Clyde Geronimi
42         PG  200821936.0             2.143885e+08        Nathan Greno
43          G   26692846.0             2.837587e+07  Stephen J. Anderson
44         PG  189412677.0             2.003550e+08          Rich Moore
45         PG  400738009.0             4.149972e+08          Chris Buck
46         PG  222527828.0             2.292492e+08            Don Hall
47         PG  341268248.0             3.412682e+08        Byron Howard
48         PG  246082029.0             2.460820e+08        Ron Clements
```

We can see some duplicated rows in "movie_title" like "Cinderella", "The Jungle Book", and "101 Dalmatians". When we check the release date, they are all different. The first one of these movies is animation, the rest are all real-actor movies filmed in recent years. We will need to delete them in case it affects our results.

[16]:
```
# Drop rows with duplicted movie_title
directors_gross_merged = directors_gross_merged.
↪drop_duplicates(subset="movie_title")

# Reset the index to get the right order
directors_gross_merged = directors_gross_merged.reset_index(drop=True)
```

Finally, let's group the directors and sum up the revenue of all the movies directed by every director to find who creates the most revenue. Here, we can use our custom sort function to save time again!

[17]:
```
# run custom sort on the data
directors_gross_merged_group = ps.
↪custom_sort(directors_gross_merged,'director','inflation_adjusted_gross')
directors_gross_merged_group
```

[17]:
```
              director  inflation_adjusted_gross
0           David Hand              5.228953e+09
1   Wolfgang Reitherman              2.721260e+09
2        Ben Sharpsteen              2.188229e+09
3          full credits              2.187091e+09
4          Ron Clements              1.318950e+09
5        Hamilton Luske              1.236036e+09
6       Wilfred Jackson              9.206087e+08
7          Roger Allers              7.616409e+08
8            Chris Buck              6.988974e+08
9        Gary Trousdale              6.791946e+08
10       Clyde Geronimi              3.785693e+08
11         Byron Howard              3.412682e+08
12         Mike Gabriel              3.301677e+08
13          Mark Dindal              3.147439e+08
14             Don Hall              2.292492e+08
15           Barry Cook              2.168078e+08
16         Ralph Zondag              2.154390e+08
17         Nathan Greno              2.143885e+08
18        Chris Sanders              2.115067e+08
19           Rich Moore              2.003550e+08
20  Stephen J. Anderson              1.482365e+08
21       Chris Williams              1.337025e+08
22          Art Stevens              1.331189e+08
23        Robert Walker              1.192183e+08
24      George Scribner              1.022545e+08
25            Will Finn              6.791017e+07
26           Ted Berman              5.055314e+07
```

It seems that in fact it is **David Hand** is the director who creates the most revenue. Our expectation **Ron Clements** is the forth if we ignore the "all credits" one.

[18]:
```
# Visualize the gross created by the directors using a bar plot.
directors_gross_plot = (
    alt.Chart(directors_gross_merged_group, width=500, height=300)
    .mark_bar()
    .encode(
        x=alt.X("director:N", title="Disney Directors", sort="-y"),
        y=alt.Y("inflation_adjusted_gross:Q", title="Gross Revenue of their␣
↪Animations(adjusted up to 2016)"),
    )
    .properties(title="Total Gross Revenue of Disney Animations Created by␣
↪Every Director")
)
directors_gross_plot
```

```
[18]: alt.Chart(...)
```

5 Discussions

In this project, I analyzed the Disney dataset and tried to find which director creates the most revenue. Before answering this question, I did some exploratory data analysis to see which movies gain the most revenue, how is the total revenue of Disney movies changes over the year. Generally, there is an increasing trend in the total number since 1980. However, the animations released in 1930 – 1960 are so popular and gorgeous and win the top revenue. That nearly determined the result because the top three directors are all active in 1930 – 1960. The top first, **David Hand** is the director of "Snow White and the Seven Dwarfs" and "Bambi". The second, **Wolfgang Reitherman**, I have introduced that he directed "101 Dalmatians", "The Jungle Books" etc. The third, **Ben Sharpsten**, is the director of "Pinocchio" and "Dumbo".

My assumption **Ron Clements** is still the director who creates the most revenue in the recent 40 years since 1980. If we ignore the effects of the inflation-adjusted rates, he can indeed win the first price. However, it will be unfair to compare the revenue without the adjustment. Let's still follow the inflation adjust gross in this project.

In this project, I did a lot of research on animations, and they bring my memory back to when I was a kid. Regardless of the inflation rate, one of the reasons that the animations in 1930 – 1960 got that much achievement is because people at that time were longing for pure and childish happiness. Those directors, in a way, create some lovely dreams for both children and adults.

Another question that could be looked at given this dataset is to find the most welcome genre movies. One could look at which genre has created the most revenue over the years. This is interesting because Disney has produced different types of movies. It is meaningful for us to have some ideas about which genre is the most popular one. We can also see how the audience's taste changes over the years. Will the audience in 70 years ago like a different kind of movies with us. Or are people the same? This might also influent Disney's filming decision.

6 References

Not all the work in this notebook is original. Some parts were borrowed from online resources. I take no credit for parts that are not mine. They were solely used for illustration purposes. Let's give to **Ceasar** what belongs to **Ceasar**.

6.1 Resources used

- Data Source
  - This Disney database used in this work was curated by **Kelly Garrett**.
- Data Visualization & Question Of Interest

  - Inspiration for generating the plotting the total revenue over the years and consider the inflation rate influence was taken from **Avinash Reddy Munnangi**.
- WikiPedia
  - Introductions of the animations and directors I mentioned.
- IMDB
  - Inspiration of the achievement of animators in the 30s-60s.

```
[ ]:
```