Visualization for HW5

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Instructions: This part of the assignment deals with visualizing the trends observed for the queries in the problem description. Run the associated cell for the specified query and convince yourself that what is presented in the output makes sense as per your expectations.

RUN THE BELOW CELL FIRST for dependecy resolution, before running any subseqeuent cell. ¶

In [1]:
```
#Import all Dependencies

# http://pandas.pydata.org/
# Documentation available at https://pandas.pydata.org/pandas-docs/stable/
# Open source, BSD-licensed library providing high-performance, easy-to-use da
ta structures and data analysis tools for the Python programming language.
import pandas as pd

# http://matplotlib.org/
# De-facto standard
import matplotlib.pyplot as plt

# This module contains classes to support completely configurable tick locatin
g and formatting
# https://matplotlib.org/api/ticker_api.html
import matplotlib.ticker as ticker

# Setup matplotlib to work inside the notebook using
%matplotlib inline
```

Query 3 : Distribution of publication types

Insert your query in the cell below (please put the query in "markdown" as plain text and do not execute the sql query as code) :

------------- **INSERT QUERY 3 HERE** ---------------- drop table if exists types;

create temp table types(type_id INTEGER primary key, type_name text); insert into types values(0, 'Journal Articles'); insert into types values(1, 'Conference and Workshop Papers'); insert into types values(3, 'Books and Thesis');

copy (select type_name as type, count(papers.id) as publications from papers join venue on papers.venue = venue.id join types on venue.type = types.type_id where year != 0 group by type_name) to '/tmp/papers_count_per_type.csv' with delimiter ',' csv header;

drop table if exists types;

In [2]:

```
# File Statistics for Query 3 Answer
# (where answer fileName of the query in the current directory is : "papers_co
unt_per_type.csv")

# Read CSV (comma-separated) file into DataFrame
papers_count_per_type = pd.read_csv('papers_count_per_type.csv')

# Concise summary of a DataFrame.
# https://pandas.pydata.org/pandas-docs/stable/generated/pandas.DataFrame.inf
o.html
papers_count_per_type.info()


# Table Answer of the query
# Return the first n rows.
# https://pandas.pydata.org/pandas-docs/stable/generated/pandas.DataFrame.hea
d.html
papers_count_per_type.head()
```

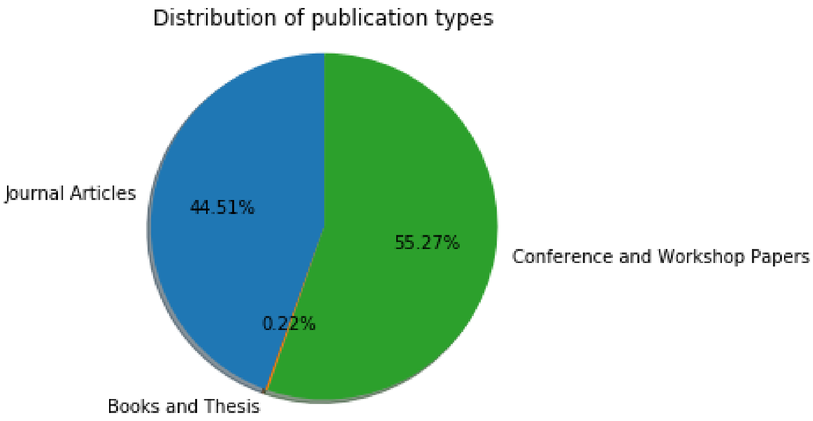
```
<class 'pandas.core.frame.DataFrame'>
RangeIndex: 3 entries, 0 to 2
Data columns (total 2 columns):
type            3 non-null object
publications    3 non-null int64
dtypes: int64(1), object(1)
memory usage: 120.0+ bytes
```

Out[2]:

	type	publications
0	Journal Articles	1401693
1	Books and Thesis	6974
2	Conference and Workshop Papers	1740812

In [3]:

```
# Visualization for Query 3 (Pie Chart)


# https://matplotlib.org/api/_as_gen/matplotlib.pyplot.subplots.html?highlight=subplots
# Create a figure and one subplot.
fig, ax = plt.subplots()
# Set a title for the axes.
# https://matplotlib.org/devdocs/api/_as_gen/matplotlib.axes.Axes.set_title.html
ax.set_title('Distribution of publication types')
# https://matplotlib.org/api/_as_gen/matplotlib.pyplot.pie.html?highlight=matplotlib%20pyplot%20pie
ax.pie(papers_count_per_type['publications'], labels=papers_count_per_type['type'], autopct='%1.2f%%', shadow=True, startangle=90)
# Equal aspect ratio ensures that pie is drawn as a circle.
ax.axis('equal')
# Plot lines and/or markers to the Axes.
# https://matplotlib.org/api/_as_gen/matplotlib.axes.Axes.plot.html
# By adding a semicolon at the end, the output is suppressed.
ax.plot();
```



Query 4 : Publications by type per year

Insert your query in the cell below (please put the query in "markdown" as plain text and do not execute the sql query as code) :

------------- **INSERT QUERY 4 HERE** ---------------- create extension tablefunc;

copy(with ans as (select * from crosstab ('select year, type, count(papers.id) as publications from papers join venue on papers.venue = venue.id where year != 0 group by year, type order by year, type', 'select distinct type from venue order by type') as res(year integer, "journal_articles_publications" integer, "conference_and_workshop_papers_publications" integer, "books_and_thesis_publications" integer)) select year, journal_articles_publications, coalesce(conference_and_workshop_papers_publications, 0) as conference_and_workshop_papers_publications, coalesce(books_and_thesis_publications, 0) as books_and_thesis_publications from ans

) to '/tmp/papers_count_per_type_per_year.csv' with delimiter ',' csv header; ;

In [4]:

```
# File Statistics for Query 4 Answer
# (where answer fileName of the query in the current directory is : "papers_count_per_type_per_year.csv")

papers_count_per_type_per_year = pd.read_csv('papers_count_per_type_per_year.csv')

papers_count_per_type_per_year.info()
papers_count_per_type_per_year.head()
```

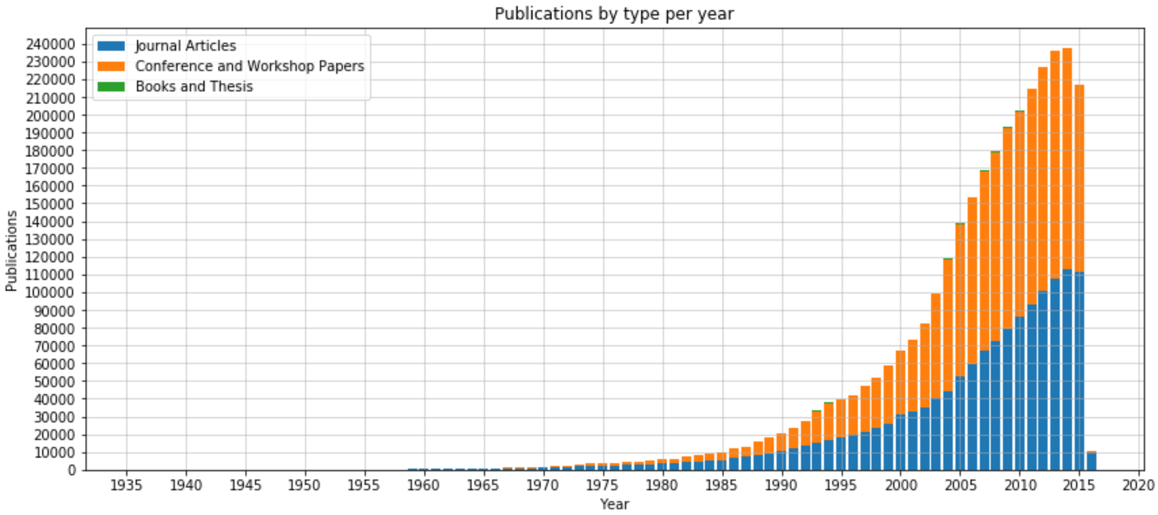
```
<class 'pandas.core.frame.DataFrame'>
RangeIndex: 81 entries, 0 to 80
Data columns (total 4 columns):
year                                           81 non-null int64
journal_articles_publications                  81 non-null int64
conference_and_workshop_papers_publications    81 non-null int64
books_and_thesis_publications                  81 non-null int64
dtypes: int64(4)
memory usage: 2.6 KB
```

Out[4]:

	year	journal_articles_publications	conference_and_workshop_papers_publications	books_anc
0	1936	12	0	0
1	1937	15	0	0
2	1938	10	0	0
3	1939	18	0	0
4	1940	10	0	0

In [5]:

```
# Visualization for Query 4 (Stacked-bar Graph)

fig, ax = plt.subplots(figsize=(14, 6))

p1 = ax.bar(papers_count_per_type_per_year['year'], papers_count_per_type_per_
year['journal_articles_publications'])
p2 = ax.bar(papers_count_per_type_per_year['year'], papers_count_per_type_per_
year['conference_and_workshop_papers_publications'], bottom=papers_count_per_t
ype_per_year['journal_articles_publications'])
p3 = ax.bar(papers_count_per_type_per_year['year'], papers_count_per_type_per_
year['books_and_thesis_publications'], bottom=papers_count_per_type_per_year[
'journal_articles_publications'] + papers_count_per_type_per_year['conference_
and_workshop_papers_publications'])

ax.set_xlabel('Year')
ax.set_ylabel('Publications')
ax.set_title('Publications by type per year')
ax.legend((p1[0], p2[0], p3[0]), ('Journal Articles', 'Conference and Workshop
 Papers', 'Books and Thesis'))
# Control the major tick label formats.
ax.xaxis.set_major_locator(ticker.MultipleLocator(base=5))
ax.yaxis.set_major_locator(ticker.MultipleLocator(base=10000))
# Turn the axes grids on or off.
# https://matplotlib.org/devdocs/api/_as_gen/matplotlib.axes.Axes.grid.html
ax.grid(axis='both', linestyle='-', linewidth=0.5)
ax.plot();
```



Query 5 : Publications per coauthors between 1995 and 2015

Insert your query in the cell below (please put the query in "markdown" as plain text and do not execute the sql query as code) :

------------- **INSERT QUERY 5 HERE** ---------------- create extension tablefunc;

copy(with ans as (select * from crosstab (' with coauthors as (select paperid, count(authid) as coauthors from paperauths group by paperid) , some_coauthors as (select paperid, coauthors, year from coauthors join papers on paperid = papers.id join venue on papers.venue = venue.id where year >= 1995 and year <= 2015) select coauthors, year, count(paperid) from some_coauthors group by coauthors, year order by coauthors, year', ' with coauthors as (select paperid, count(authid) as coauthors from paperauths group by paperid) , some_coauthors as (select paperid, coauthors, year from coauthors join papers on paperid = papers.id join venue on papers.venue = venue.id where year >= 1995 and year <= 2015) select distinct year from some_coauthors order by year') as res(coauthors integer, year_1995 integer, year_1996 integer, year_1997 integer, year_1998 integer, year_1999 integer, year_2000 integer, year_2001 integer, year_2002 integer, year_2003 integer, year_2004 integer, year_2005 integer, year_2006 integer, year_2007 integer, year_2008 integer, year_2009 integer, year_2010 integer, year_2011 integer, year_2012 integer, year_2013 integer, year_2014 integer, year_2015 integer)

) select coauthors as coauthors, coalesce(year_1995, 0) as year_1995, coalesce(year_1996, 0) as year_1996, coalesce(year_1997, 0) as year_1997, coalesce(year_1998, 0) as year_1998, coalesce(year_1999, 0) as year_1999, coalesce(year_2000, 0) as year_2000, coalesce(year_2001, 0) as year_2001, coalesce(year_2002, 0) as year_2002, coalesce(year_2003, 0) as year_2003, coalesce(year_2004, 0) as year_2004, coalesce(year_2005, 0) as year_2005, coalesce(year_2006, 0) as year_2006, coalesce(year_2007, 0) as year_2007, coalesce(year_2008, 0) as year_2008, coalesce(year_2009, 0) as year_2009, coalesce(year_2010, 0) as year_2010, coalesce(year_2011, 0) as year_2011, coalesce(year_2012, 0) as year_2012, coalesce(year_2013, 0) as year_2013, coalesce(year_2014, 0) as year_2014, coalesce(year_2015, 0) as year_2015 from ans) to '/tmp/papers_count_per_coauthors_between_1995_and_2015.csv' with delimiter ',' csv header; ;

In [6]:
```
# File Statistics for Query 4 Answer
# (where answer fileName of the query in the current directory is : "papers_count_per_coauthors_between_1995_and_2015.csv")

papers_count_per_coauthors_between_1995_and_2015 = pd.read_csv('papers_count_per_coauthors_between_1995_and_2015.csv')

papers_count_per_coauthors_between_1995_and_2015.info()
papers_count_per_coauthors_between_1995_and_2015.head()
```

```
<class 'pandas.core.frame.DataFrame'>
RangeIndex: 77 entries, 0 to 76
Data columns (total 22 columns):
coauthors    77 non-null int64
year_1995    77 non-null int64
year_1996    77 non-null int64
year_1997    77 non-null int64
year_1998    77 non-null int64
year_1999    77 non-null int64
year_2000    77 non-null int64
year_2001    77 non-null int64
year_2002    77 non-null int64
year_2003    77 non-null int64
year_2004    77 non-null int64
year_2005    77 non-null int64
year_2006    77 non-null int64
year_2007    77 non-null int64
year_2008    77 non-null int64
year_2009    77 non-null int64
year_2010    77 non-null int64
year_2011    77 non-null int64
year_2012    77 non-null int64
year_2013    77 non-null int64
year_2014    77 non-null int64
year_2015    77 non-null int64
dtypes: int64(22)
memory usage: 13.3 KB
```

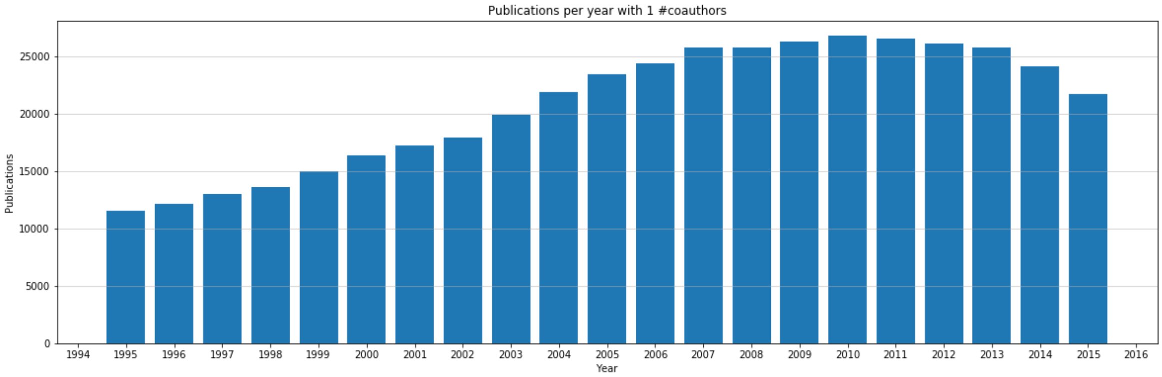
Out[6]:

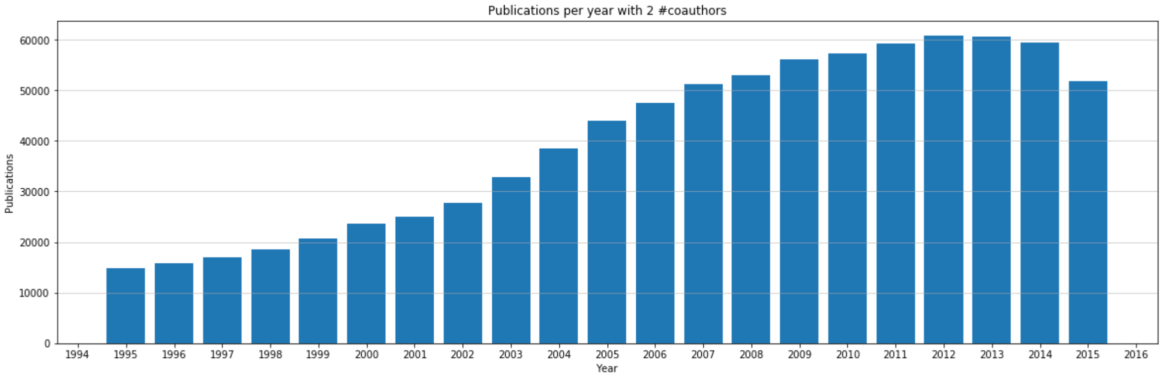
	coauthors	year_1995	year_1996	year_1997	year_1998	year_1999	year_2000	year_2001	year_
0	1	11511	12157	13013	13591	14953	16368	17227	1790
1	2	14901	15840	17026	18621	20776	23672	25078	2767
2	3	7939	8664	10153	11603	13394	15681	17250	2001
3	4	2909	3297	4107	4831	5677	6828	7906	9465
4	5	1105	1150	1490	1731	2100	2551	3024	3687

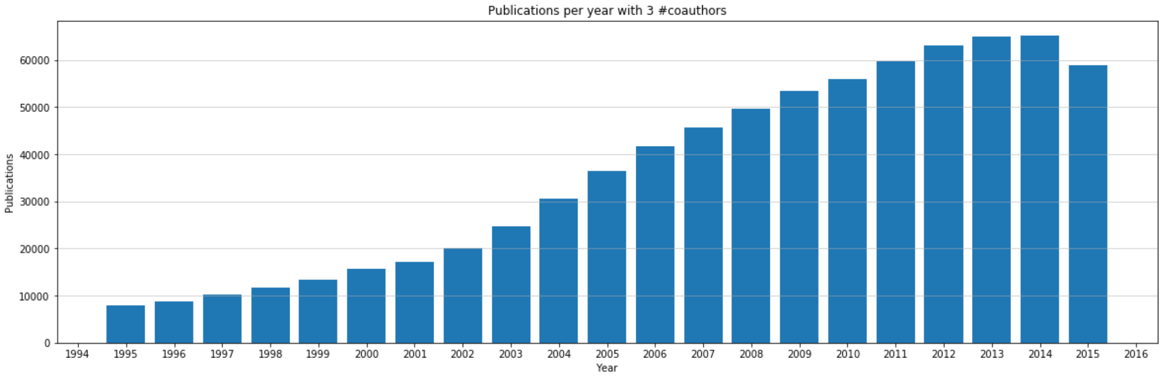
5 rows × 22 columns

In [7]:

```
# Visualization for Query 5 (only between 1-5 #co-authors) (Multiple Bar plots)

x = list(range(1995, 2016))
author_ctr = 0
results_to_display = 5

for coauthors in papers_count_per_coauthors_between_1995_and_2015['coauthors']:
    h = papers_count_per_coauthors_between_1995_and_2015.loc[papers_count_per_coauthors_between_1995_and_2015['coauthors'] == coauthors].drop('coauthors', 1)
    fig, ax = plt.subplots(figsize=(20, 6))
    ax.set_xlabel('Year')
    ax.set_ylabel('Publications')
    ax.set_title('Publications per year with %d #coauthors' % (coauthors,))
    ax.xaxis.set_major_locator(ticker.MultipleLocator(base=1))
    ax.grid(axis='y', linestyle='-', linewidth=0.5)
    ax.bar(x, h.iloc[0].values)
    ax.plot();
    author_ctr += 1

    if author_ctr == results_to_display:
        break
```


Publications per year with 1 #coauthors
Publications
0
5000
10000
15000
20000
25000
1994
1995
1996
1997
1998
1999
2000
2001
2002
2003
2004
2005
2006
2007
2008
2009
2010
2011
2012
2013
2014
2015
2016
Year


Publications per year with 2 #coauthors
Publications
0
10000
20000
30000
40000
50000
60000
1994
1995
1996
1997
1998
1999
2000
2001
2002
2003
2004
2005
2006
2007
2008
2009
2010
2011
2012
2013
2014
2015
2016
Year


Publications per year with 3 #coauthors
Publications
0
10000
20000
30000
40000
50000
60000
1994
1995
1996
1997
1998
1999
2000
2001
2002
2003
2004
2005
2006
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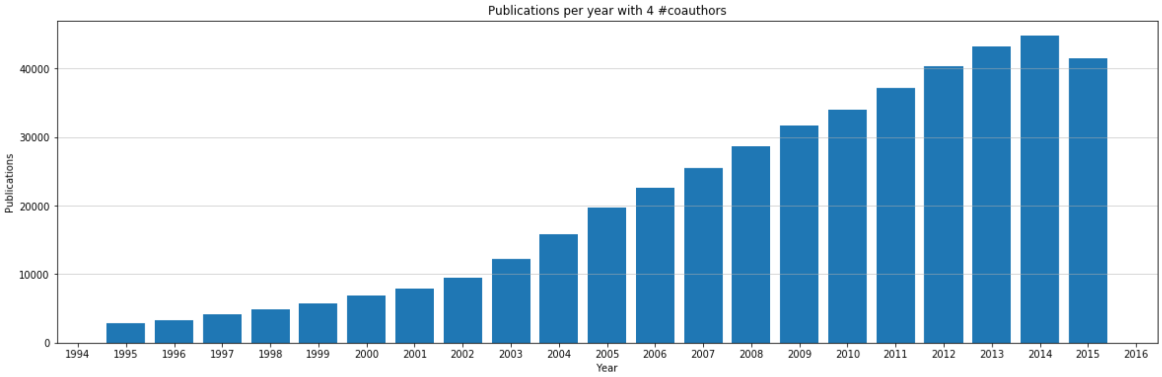
2013
2014
2015
2016
Year


Publications per year with 4 #coauthors
Publications
0
10000
20000
30000
40000
1994
1995
1996
1997
1998
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2000
2001
2002
2003
2004
2005
2006
2007
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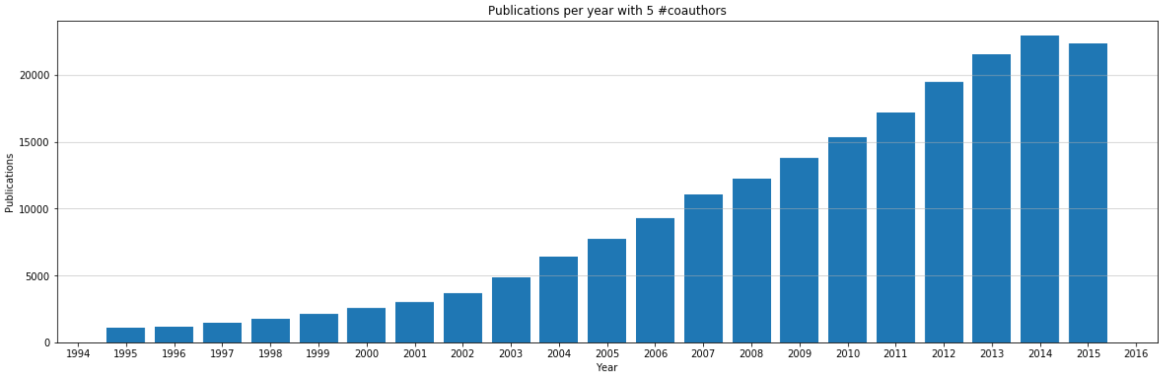
2011
2012
2013
2014
2015
2016
Year


Publications per year with 5 #coauthors
Publications
0
5000
10000
15000
20000
1994
1995
1996
1997
1998
1999
2000
2001
2002
2003
2004
2005
2006
2007
2008
2009
2010
2011
2012
2013
2014
2015
2016
Year