

Moving Beyond R and Exploratory Data Analysis



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Overview



Beyond Exploratory Data Analysis

Demo

Alternatives to R

Conclusion



This is just the tip of the iceberg!

Other Types of Data Analysis

Descriptive

Exploratory

Inferential

Predictive

Causal

Mechanistic

Advanced Programming Features

Procedural

Outbound calls

Functional

Inbound calls

Object-oriented

Distributed programming

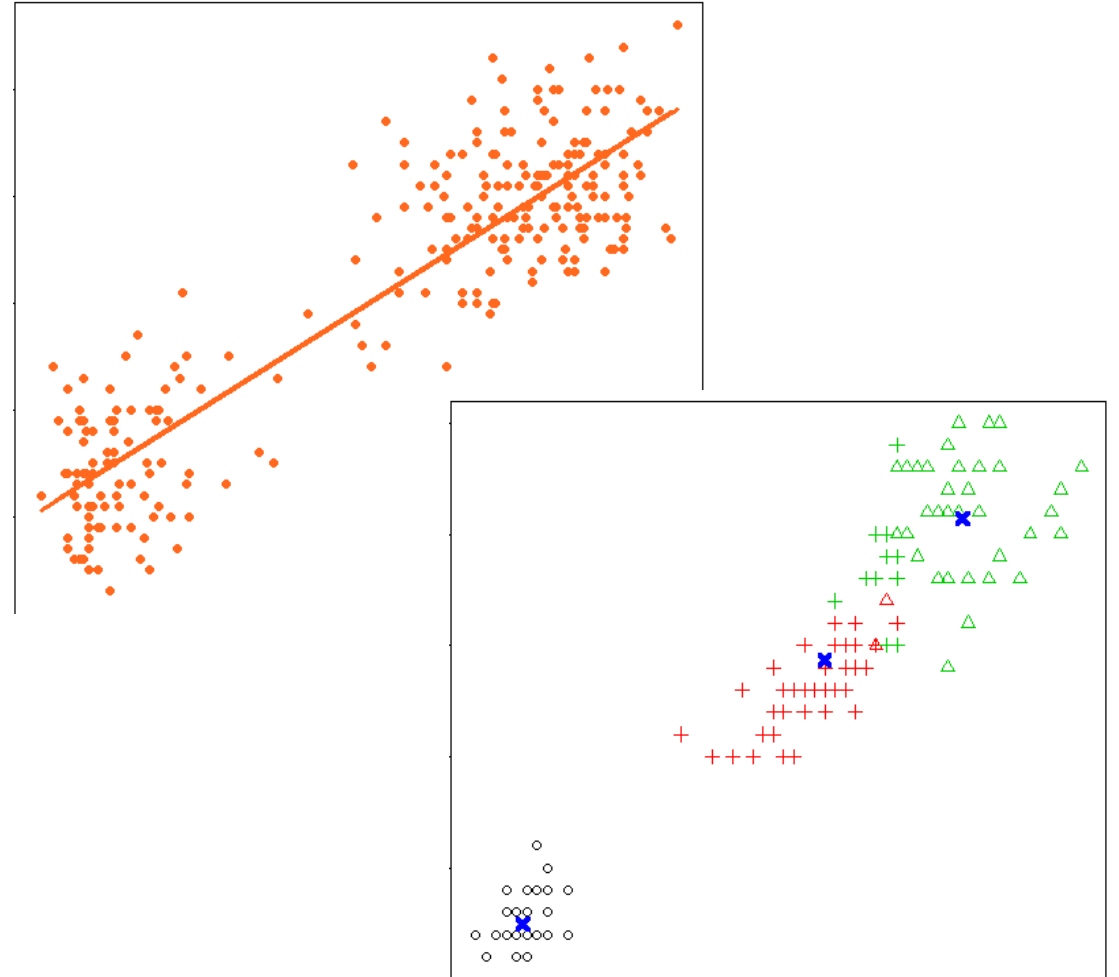
Advanced Statistical Analysis

Statistical modeling

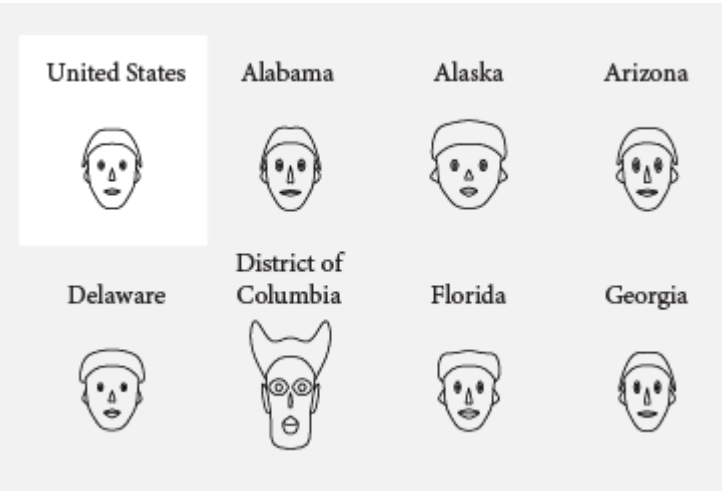
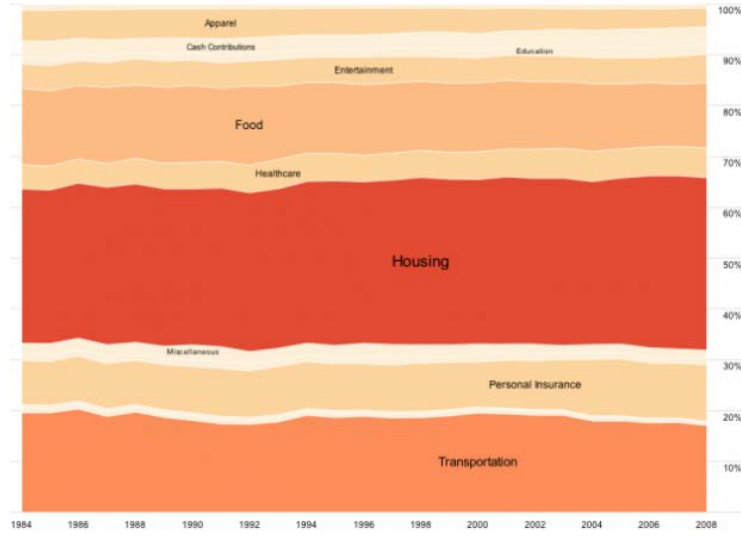
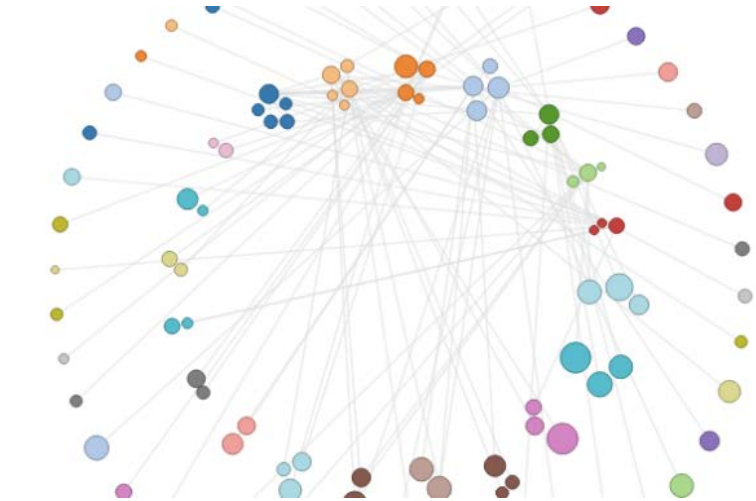
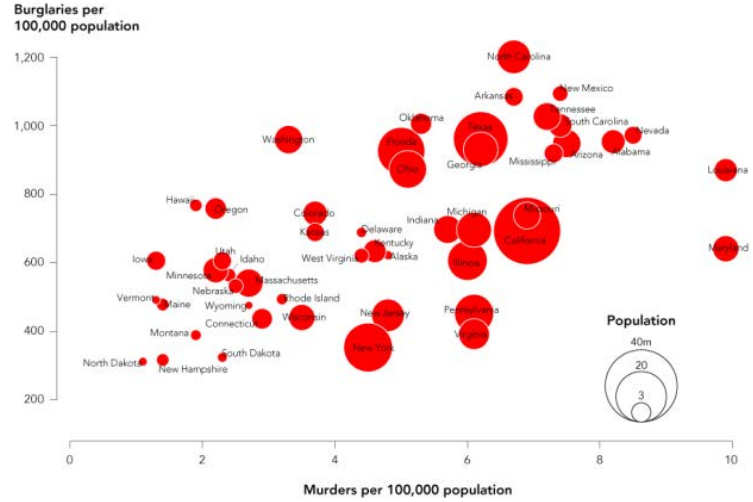
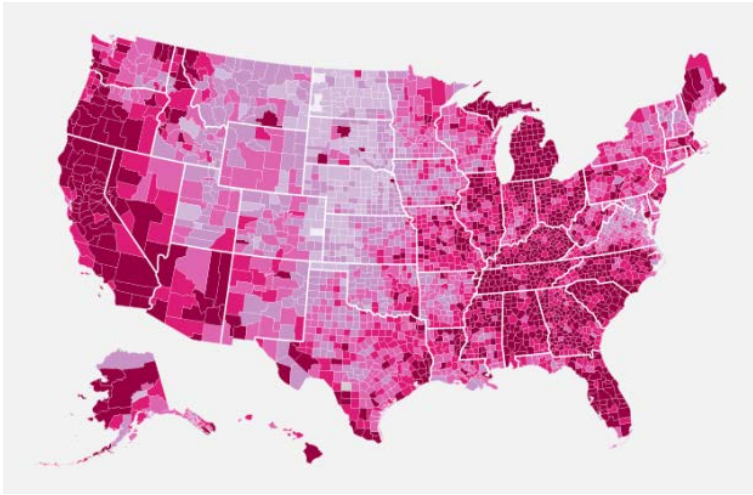
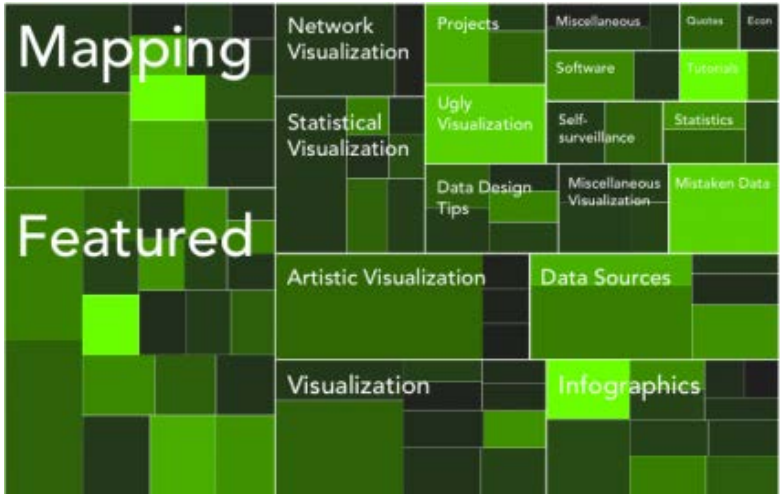
Cluster analysis

Dimensionality reduction

Analysis of Variance (ANOVA)



Advanced Data Visualization



Source: Nathan Yau (www.flowingdata.com)

Data Mining and Machine Learning

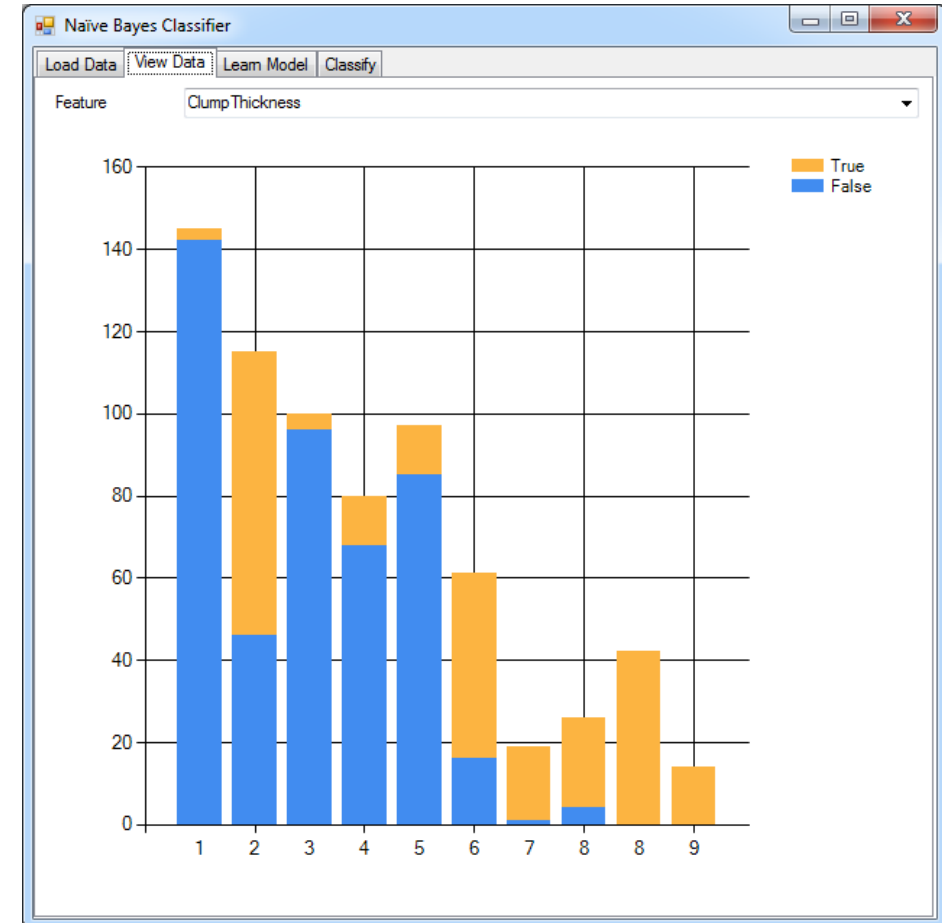
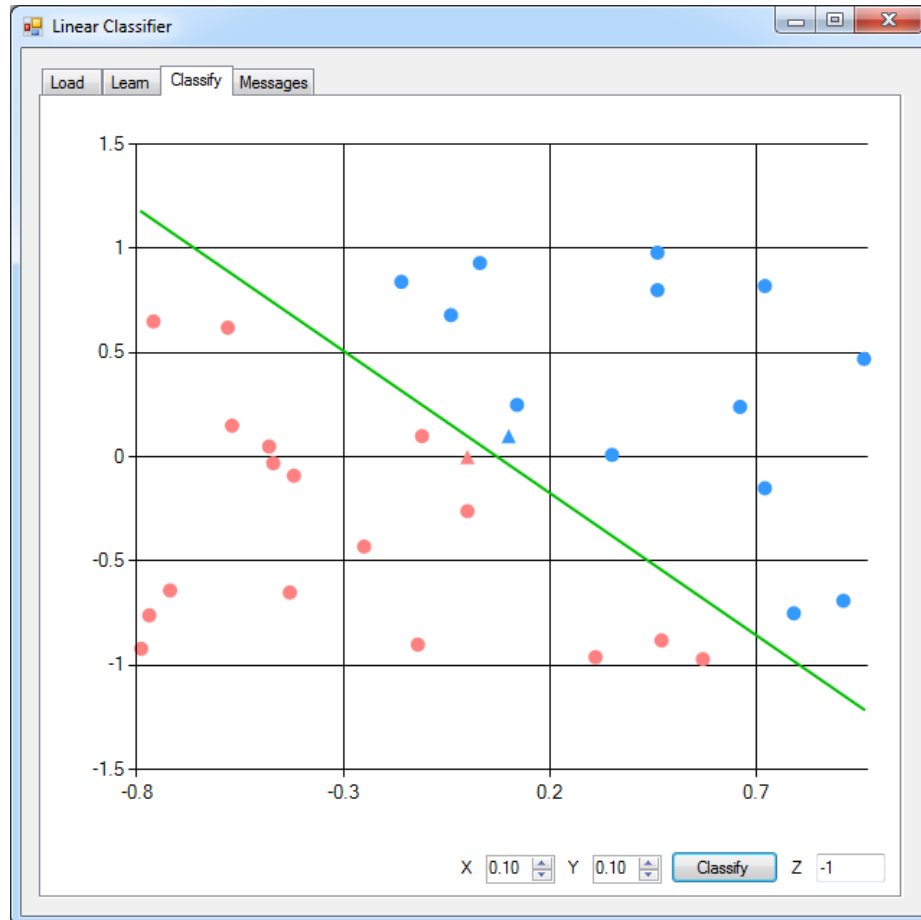




Photo by Danielle Langlois

Load the Data

Scatterplot Matrix

Scatterplot

Linear Regression Model

Plot Linear Model

Correlation Coefficient

Linear Model Summary

Linear Model Prediction

Caveats



Photos by Radomił Binek,
Danielle Langlois, and Frank Mayfield

Load the Data

Scatterplot Matrix

Scatterplot

Create k-Means Clusters

Plot Clusters as Shapes

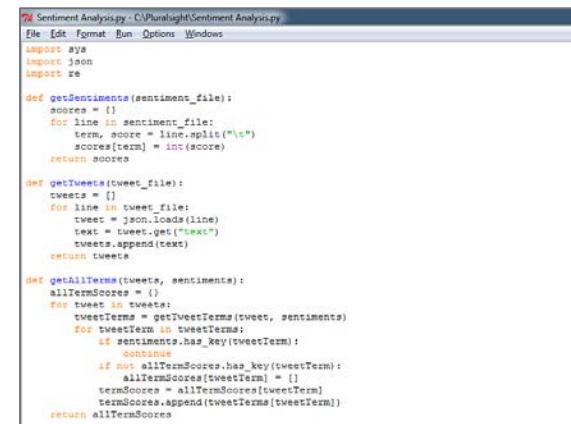
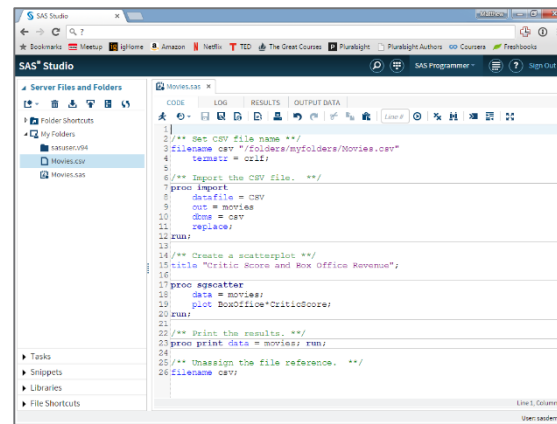
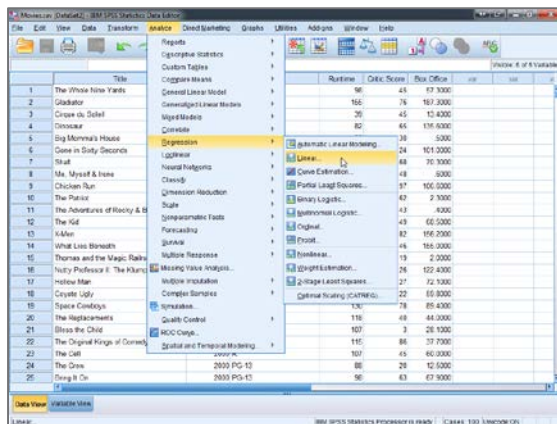
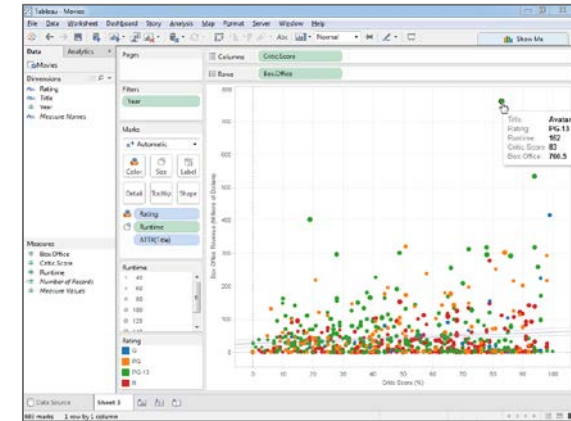
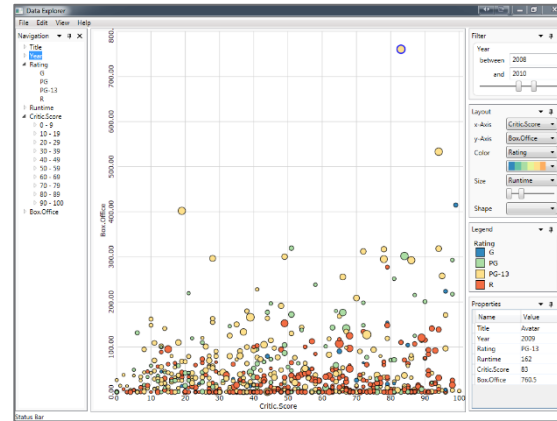
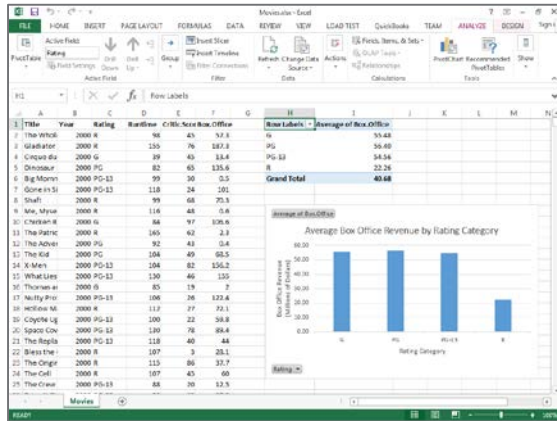
Plot Centers of Clusters

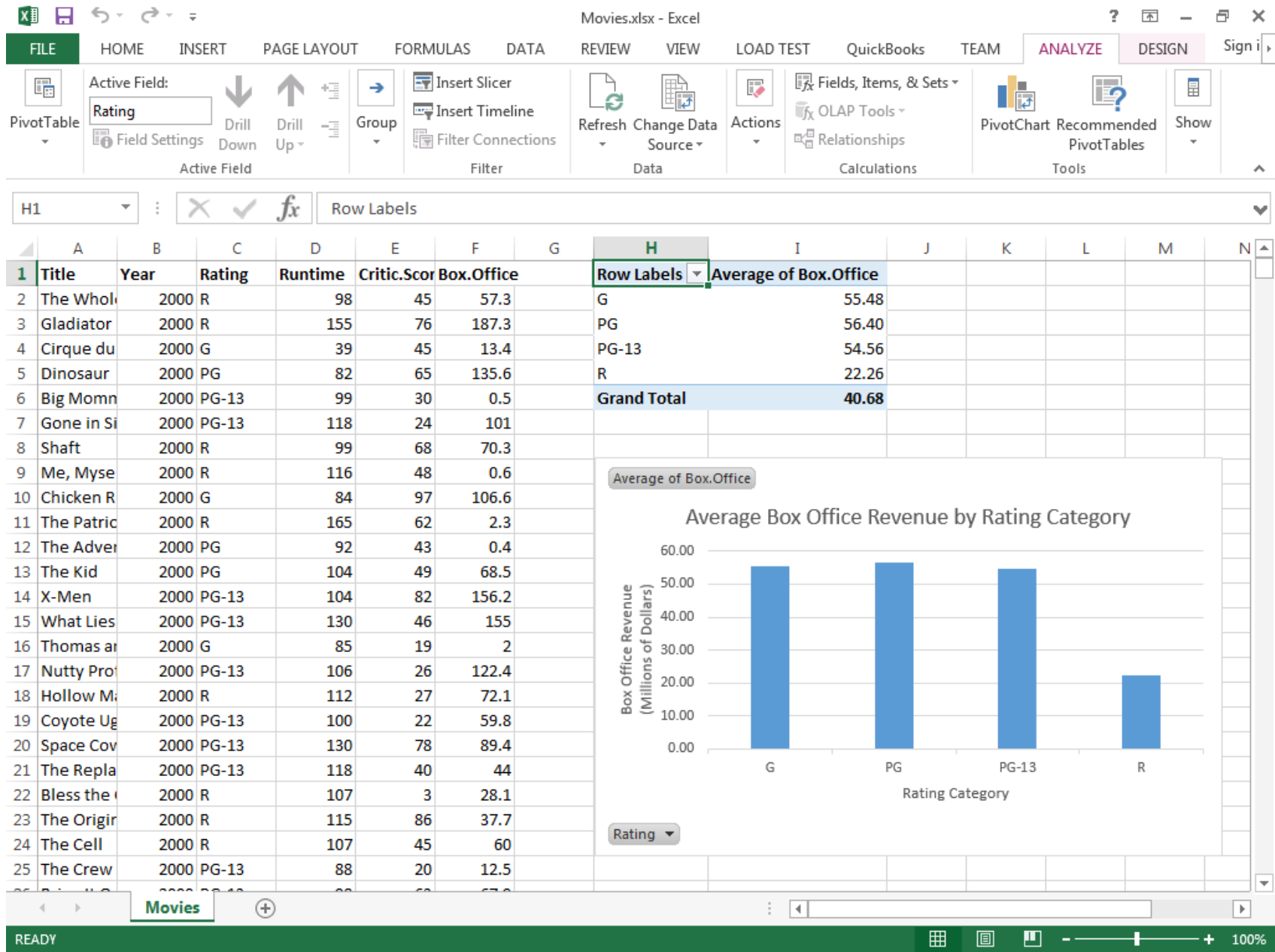
Table of Clusters

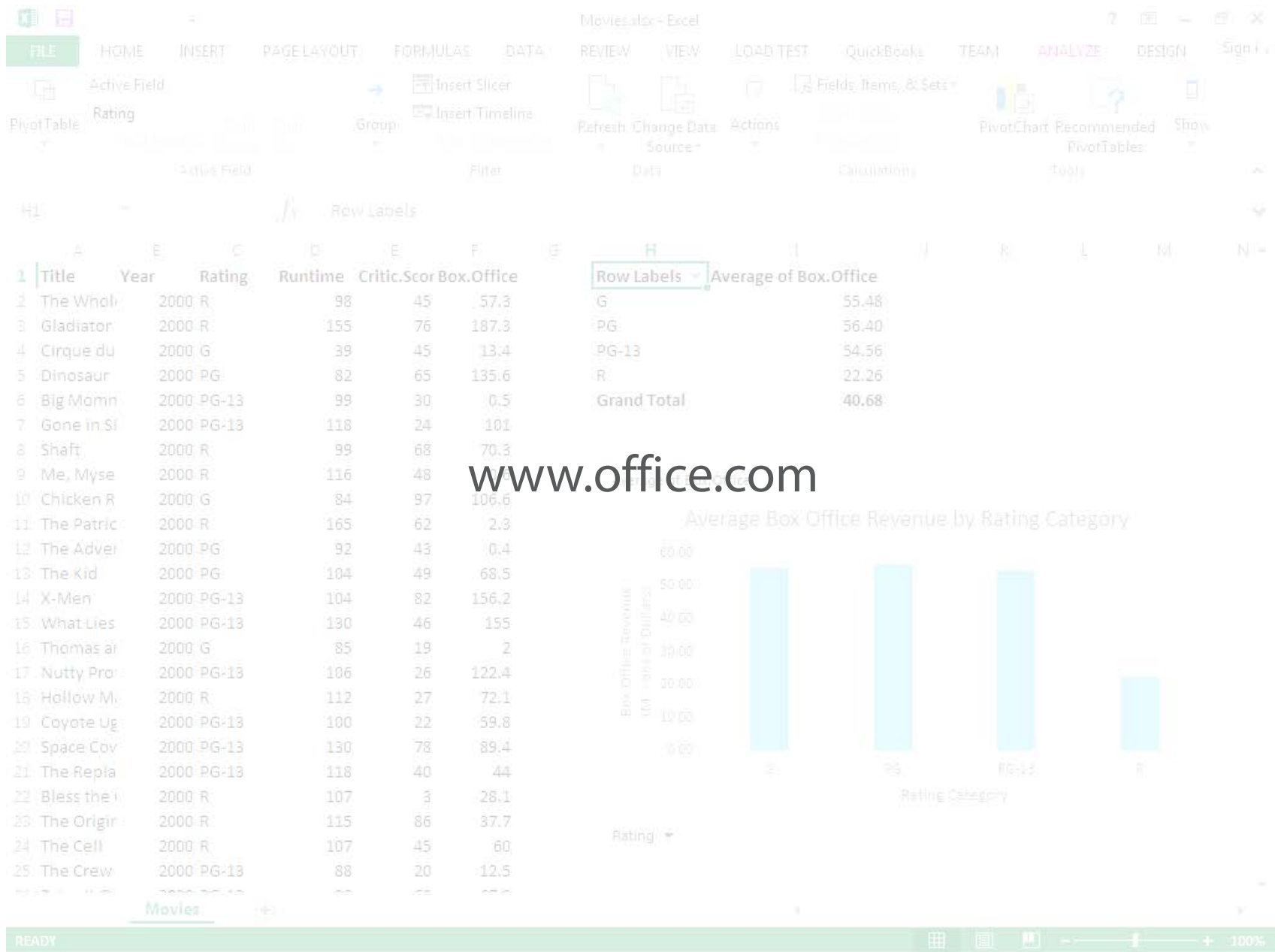
Caveats



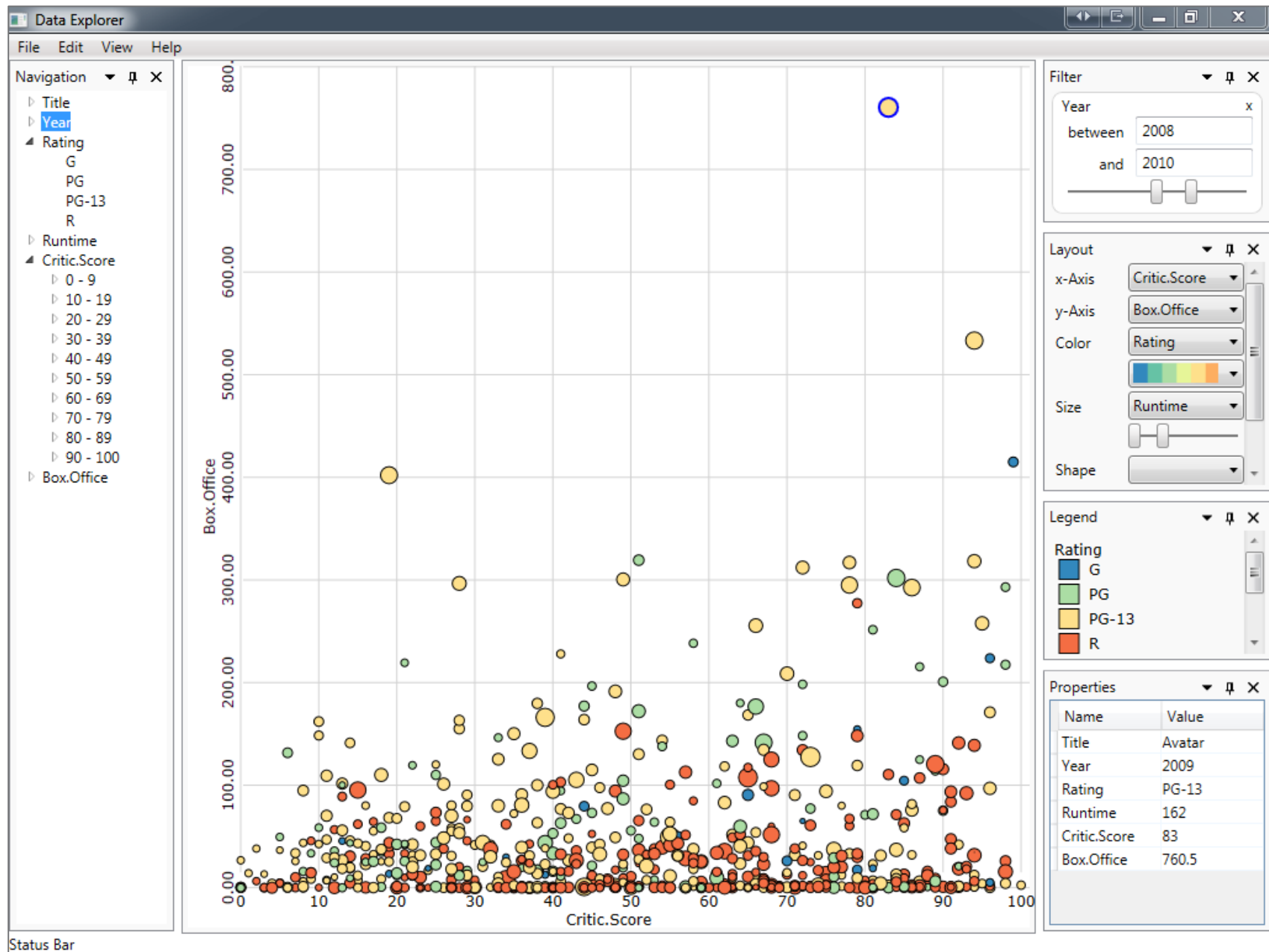
Alternatives to R





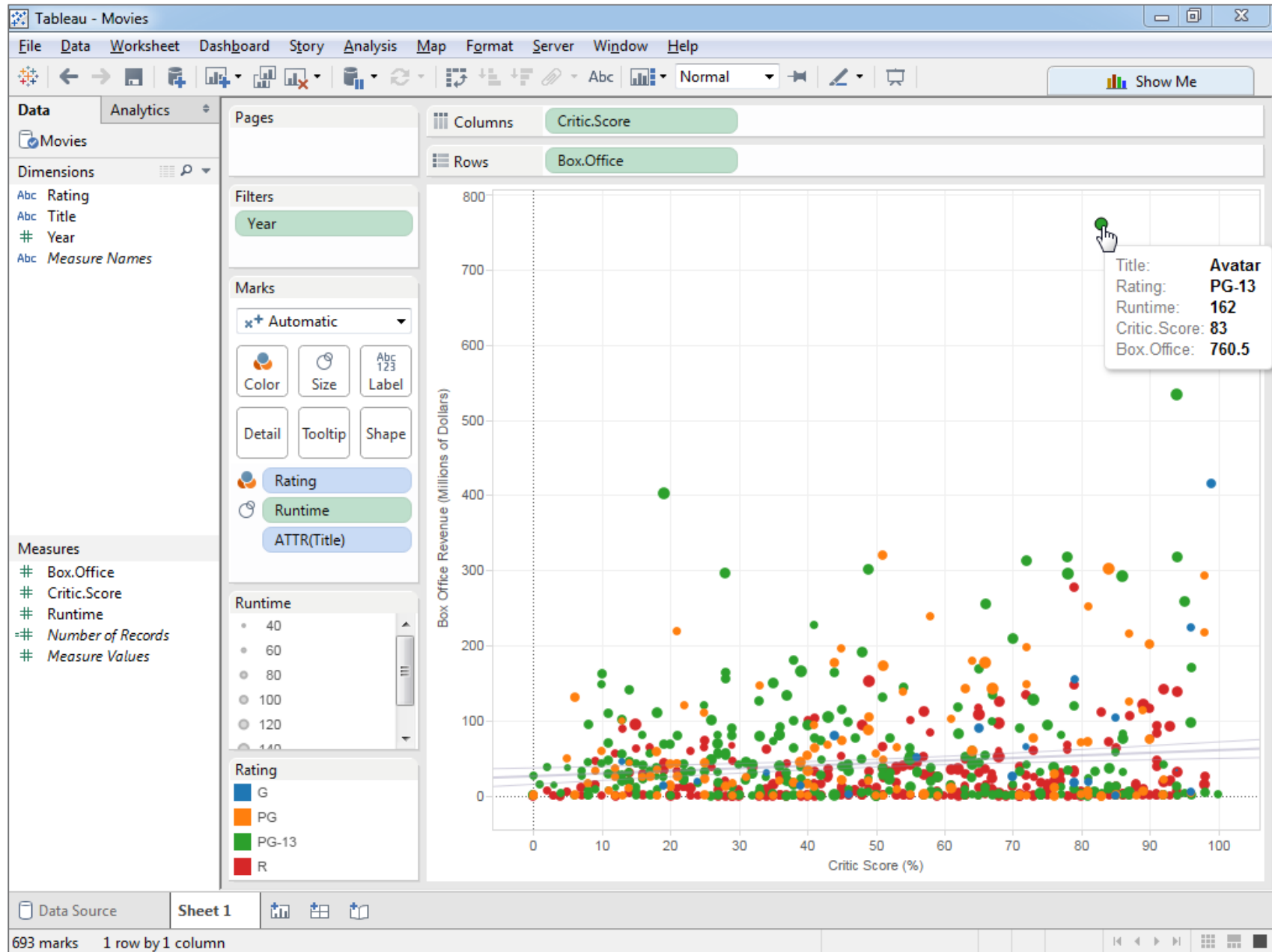


www.office.com





Status Bar



IBM SPSS Statistics Data Editor window showing the 'Analyze' menu path: **Analyze > Regression > Linear...**

The data table contains the following information:

	Title	Runtime	Critic.Score	Box.Office	var	var	var
1	The Whole Nine Yards	98	45	57.3000			
2	Gladiator	155	76	187.3000			
3	Cirque du Soleil	39	45	13.4000			
4	Dinosaur	82	65	135.6000			
5	Big Momma's House	30		.5000			
6	Gone in Sixty Seconds	24		101.0000			
7	Shaft	68		70.3000			
8	Me, Myself & Irene	48		.6000			
9	Chicken Run	97		106.6000			
10	The Patriot	62		2.3000			
11	The Adventures of Rocky & Bullwinkle	43		.4000			
12	The Kid	49		68.5000			
13	X-Men	82		156.2000			
14	What Lies Beneath	46		155.0000			
15	Thomas and the Magic Railroad	19		2.0000			
16	Nutty Professor II: The Klump	26		122.4000			
17	Hollow Man	27		72.1000			
18	Coyote Ugly	22		59.8000			
19	Space Cowboys	130	78	89.4000			
20	The Replacements	118	40	44.0000			
21	Bless the Child	107	3	28.1000			
22	The Original Kings of Comedy	115	86	37.7000			
23	The Cell	107	45	60.0000			
24	The Crew	88	20	12.5000			
25	Bring It On	98	63	67.9000			

At the bottom, the status bar indicates: **Linear...** | IBM SPSS Statistics Processor is ready | Cases: 100 | Unicode:ON

Movies.sav [DataSet2] - IBM SPSS Statistics Data Editor

File Edit View Data Transform Analyze Direct Marketing Graphs Utilities Add-ons Window Help

Reports
Descriptive Statistics
Custom Tables
Compare Means
General Linear Model
Generalized Linear Models
Mixed Models
Correlate
Regression
Loglinear
Neural Networks
Classify
Dimension Reduction
Bayes
Nonparametric Tests
Forecasting
Survival
Multiple Response
Missing Value Analysis...
Multiple Imputation
Complex Samples
Simulation...
Quality Control
ROC Curve...
Spatial and Temporal Modeling...

Automatic Linear Modeling...
Linear...
Curve Estimation...
Partial Least Squares...
Multinomial Logistic...
Ordinal...
Probit...
Nonlinear...
Weight Estimation...
2-Stage Least Squares...
Optimal Scaling (CATREG)...

Visible: 5 of 6 Variables

	Title	Runtime	Critic Score	Box Office	Year	Rating
1	The Whole Nine Yards	98	45	57.3000		
2	Gladiator	155	76	187.3000		
3	Cirque du Soleil	39	45	13.4000		
4	Dinosaur	82	65	135.6000		
5	Big Momma's House		30	5000		
6	Gone in Sixty Seconds		24	101.0000		
7	Shaft		68	70.3000		
8	Me, Myself & Irene		48	6000		
9	Chicken Run		97	106.6000		
10	The Patriot		43	4000		
11	The Adventures of Rocky & Bullwinkle		49	68.5000		
12	The Kid		82	156.2000		
13	X-Men		46	155.0000		
14	What Lies Beneath		19	2.0000		
15	Thomas and the Magic Railroad		26	122.4000		
16	Nutty Professor II: The Klump		27	72.1000		
17	Hollow Man		22	59.8000		
18	Coyote Ugly		130	89.4000		
19	Space Cowboys		118	44.0000		
20	The Replacements		107	3.28.1000		
21	Bless the Child		115	86.37.7000		
22	The Original Kings of Comedy		107	45.60.0000		
23	The Cell	2000-R				
24	The Crew	2000 PG-13	88	20.12.5000		
25	Bring It On	2000 PG-13	98	63.67.9000		

Data View Variable View

Linear...

IBM SPSS Statistics Processor is ready Cases: 100 Unicode: ON

www.ibm.com/software/analytics/spss

SAS Studio

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- Movies.csv
- Movies.sas

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import sys
import json
import re

def getSentiments(sentiment_file):
    scores = {}
    for line in sentiment_file:
        term, score = line.split("\t")
        scores[term] = int(score)
    return scores

def getTweets(tweet_file):
    tweets = []
    for line in tweet_file:
        tweet = json.loads(line)
        text = tweet.get("text")
        tweets.append(text)
    return tweets

def getAllTerms(tweets, sentiments):
    allTermScores = {}
    for tweet in tweets:
        tweetTerms = getTweetTerms(tweet, sentiments)
        for tweetTerm in tweetTerms:
            if sentiments.has_key(tweetTerm):
                continue
            if not allTermScores.has_key(tweetTerm):
                allTermScores[tweetTerm] = []
            termScores = allTermScores[tweetTerm]
            termScores.append(tweetTerms[tweetTerm])
    return allTermScores
```

Summary

Beyond Exploratory Data Analysis

Demo

Alternatives to R

Conclusion



Where to Go Next

R website: <http://www.cran.r-project.org>

R Studio: <http://www.rstudio.com>

Pluralsight: <http://www.pluralsight.com>

Coursera: <https://www.coursera.org>

Flowing Data: <http://flowingdata.com>

Revolutions: <http://blog.revolutionanalytics.com>

R-Blogger: <http://www.r-bloggers.com>

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Course Summary

Introduction to R

Transforming and Cleaning Data

Calculating Descriptive Statistics

Visualizing Data

Moving Beyond R and EDA



Special Thanks

Nathan Yau

Jeff Leek

Roger Peng

Karen Bittner

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Cory House

Thank You!