

SOCR: Statistics Online Computational Resource

It's Online, Therefore It Exists!



Ivo D. Dinov, Juana Sanchez & Nicolas Christou

www.SOCR.ucla.edu

The SOCR Resource

SOCR: Statistics Online Computational Resource - Netscape

File Edit View Go Bookmarks Tools Window Help

Home My Netscape Search Customize...

New Tab SCI-BITES: Journals Ranke... SOCR Events SOCR CAUSE... SOCR: Statistics Online Co...

SOCR Home Tools Distributions Experiments Analyses Games Modeler Charts More Translate SOCR

Statistics Online Computational Resource

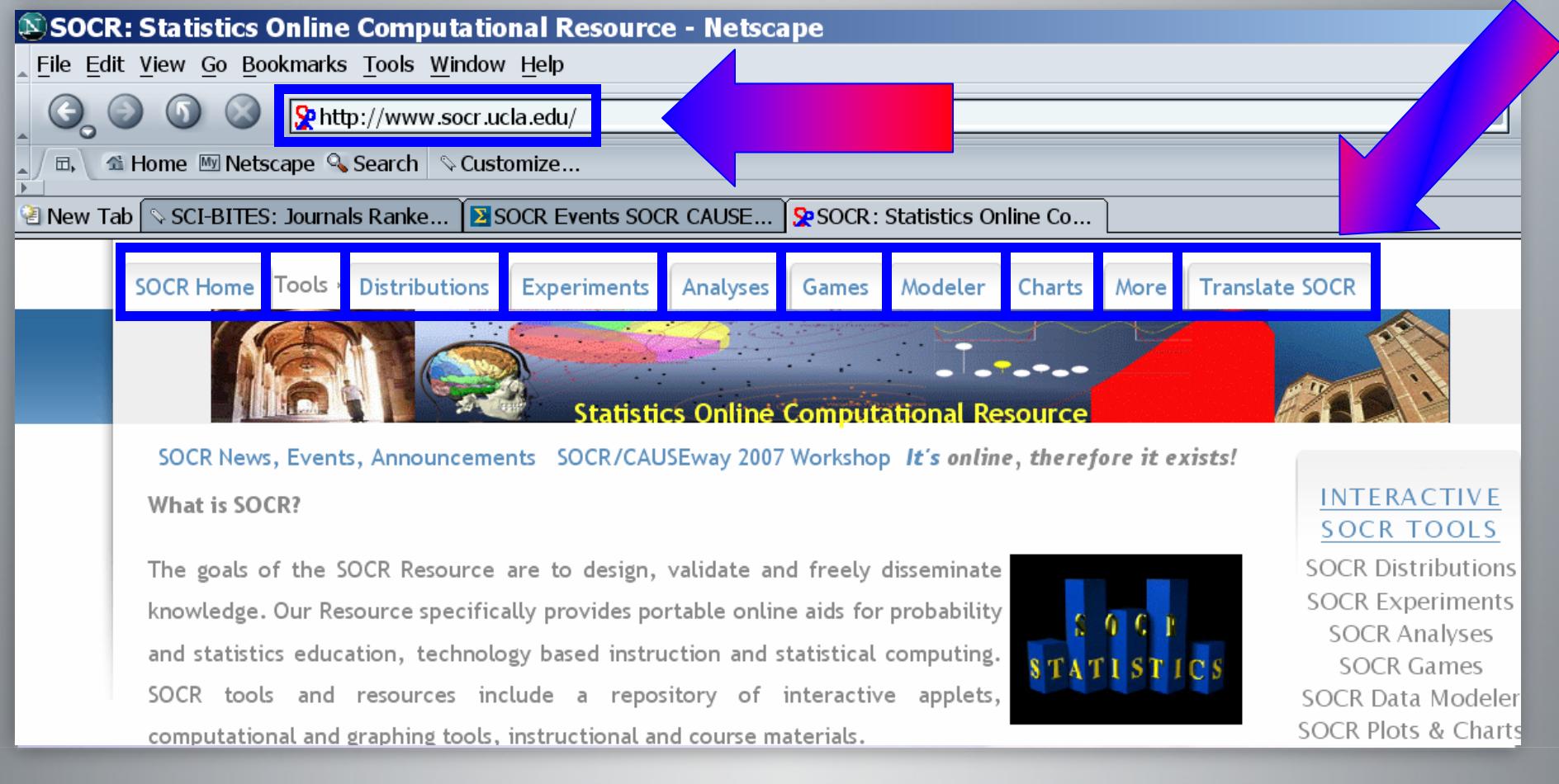
SOCR News, Events, Announcements SOCR/CAUSEway 2007 Workshop *It's online, therefore it exists!*

What is SOCR?

The goals of the SOCR Resource are to design, validate and freely disseminate knowledge. Our Resource specifically provides portable online aids for probability and statistics education, technology based instruction and statistical computing. SOCR tools and resources include a repository of interactive applets, computational and graphing tools, instructional and course materials.

INTERACTIVE
SOCR TOOLS

SOCR Distributions
SOCR Experiments
SOCR Analyses
SOCR Games
SOCR Data Modeler
SOCR Plots & Charts

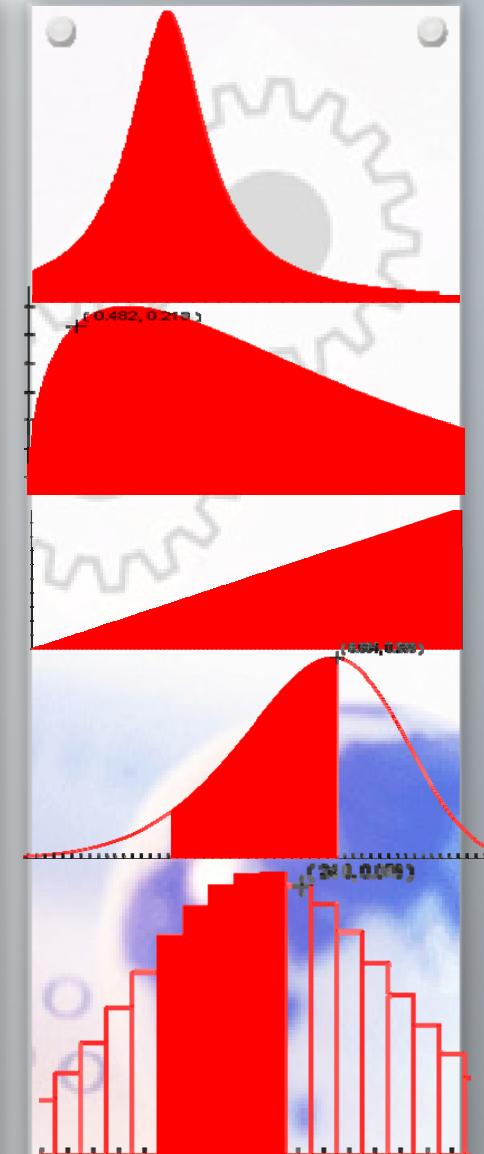


FEATURES

- 45+ Distributions
- Graphs
- PDFs
- CDFs
- Inverse CDFs
- Random Sampling
- Moments
- Web Interface

SOCR Distributions

Bernoulli Distribution; Beta Distribution; Beta (Generalized) Distribution; Binomial Distribution; Birthday Distribution; Cauchy Distribution; Chi-Square Distribution; Circle Distribution; Continuous Uniform Distribution; Die Distribution; Discrete ArcSine Distribution; Discrete Uniform Distribution; Erlang Distribution; Error Distribution; Exponential Distribution; Fisher's F Distribution; Fisher-Tippett Distribution; Gamma Distribution; General Cauchy Distribution; Geometric Distribution; Gilbrats Distribution; Gumbel Distribution; Half-Normal Distribution; HyperGeometric Distribution; Laplace Distribution; Logarithmic Distribution; Logistic Distribution; Log-Normal Distribution; Matching Distribution; Maxwell Distribution; MixtureDistribution; Negative-Binomial Distribution; Normal Distribution; Pareto Distribution; Point-Mass Distribution; Poisson Distribution; Poker-Dice Distribution; Power-Function Distribution; Rayleigh Distribution; Student's T Distribution; Student's T Non-Central Distribution; Triangle Distribution; Von Mises Distribution; WalkMaxDistribution; WalkPositionDistribution; Weibull Distribution;



[http://www.socr.ucla.edu/htmls/SOCR Distributions.html](http://www.socr.ucla.edu/htmls/SOCR_Distributions.html)

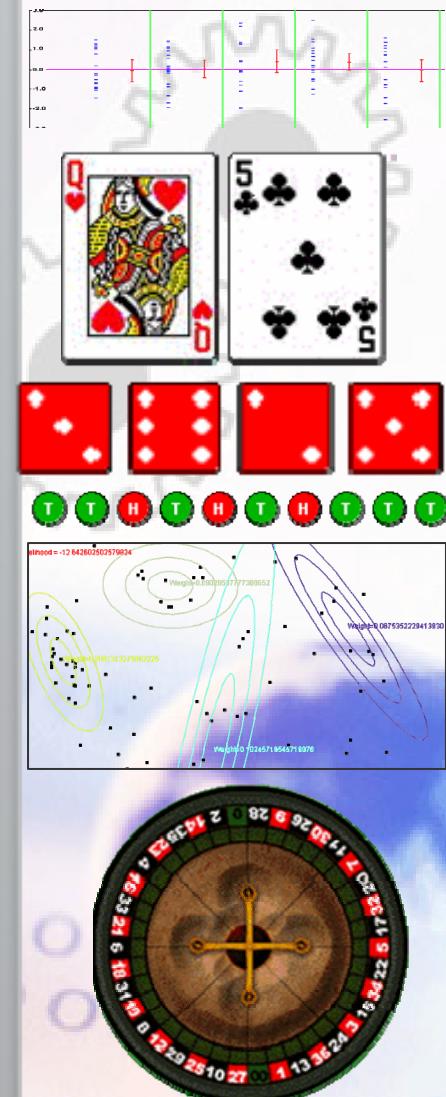
[http://wiki.stat.ucla.edu/socr/index.php/About pages for SOCR Distributions](http://wiki.stat.ucla.edu/socr/index.php/About_pages_for_SOCR_Distributions)

FEATURES

- 60+ Experiments
- Simulations
- Summary Stats
- Model vs. Observ.
- GUIs
- Web Interface
- Based on VLPS

SOCR Experiments

Ballot Experiment Ball and Urn Experiment Bertrand Experiment Beta Coin Experiment Beta Estimate Experiment Binomial Coin Experiment Binomial Timeline Experiment Birthday Experiment Bivariate Normal Experiment Bivariate Uniform Experiment Buffon's Coin Experiment Buffon's Needle Experiment CardExperiment Chi Square Dice Experiment Chuck A Luck Experiment Coin Die Experiment Coin Sample Experiment Confidence Interval Experiment Coupon Collector Experiment Craps Experiment Dice Experiment Dice Sample Experiment Die Coin Experiment Finite Order Statistic Experiment Fire Experiment Galton Board Experiment Game Gamma Estimate Experiment Gamma Experiment Markov Chain Experiment Match Experiment Mean Estimate Experiment Mean Test Experiment Mixture Model EM Experiment Monty Hall Experiment Negative Binomial Experiment Normal Estimate Experiment Order Statistics Experiment Pareto Estimate Experiment Problem of Points Experiment Two-Dimensional Poisson Experiment Poisson Experiment Two-Type Poisson Experiment Poker Dice Experiment Poker Experiment Probability Plot Experiment Proportion Estimate Experiment Proportion Test Experiment Quantile JApplet Random Variable Experiment Randomm Walk Experiment Red and Black Experiment Roulette Experiment Sample Mean Experiment Sign Test Experiment Spinner Experiment Triangle Experiment Uniform Estimate Experiment Variance Estimate Experiment Variance Test Experiment Voter Experiment



http://www.socr.ucla.edu/htmls/SOCR_Experiments.html

[http://wiki.stat.ucla.edu/socr/index.php/About pages for SOCR Experiments](http://wiki.stat.ucla.edu/socr/index.php/About_pages_for_SOCR_Experiments)

FEATURES

- Param+NonParam
- Graphs
- Summary Stats
- R Interface
- GUIs
- Web Interface

SOCR Analyses

ANOVA - One Way

ANOVA - Two Way

χ^2 Model Goodness-of-Fit Test

Multiple Regression Analysis

One Sample T Test

Simple Regression Analysis

Two Independent Sample T Test

Two Independent Sample Wilcoxon
Rank Sum Test

Two Paired Sample Sign-Test

Two Paired Sample Signed-Rank
Test (Wilcoxon)

Two Paired Sample T Test

RESULT:

Sample size=19

INDEPENDENT = Group

DEPENDENT = Dependent

DF Model = 2

DF Error = 16

DF Corrected Total = 18

RSS MODEL = 45030.94956140351

RSS ERROR = 2714.2083333333335

RSS TOTAL = 47745.15789473685

MSS MODEL = 22515.474780701756

MSS ERROR = 169.63802083333334

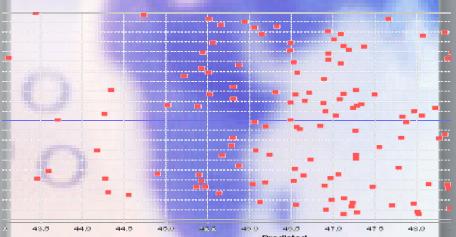
F-VALUE = 132.72658257916632

P-VALUE = 1.0907141856364433E-10

Residual Normal QQ Plot



Residual on Fit Plot



http://www.socr.ucla.edu/htmls/SOCR_Analyses.html

[http://wiki.stat.ucla.edu/socr/index.php/About pages for SOCR Analyses](http://wiki.stat.ucla.edu/socr/index.php/About_pages_for_SOCR_Analyses)

FEATURES

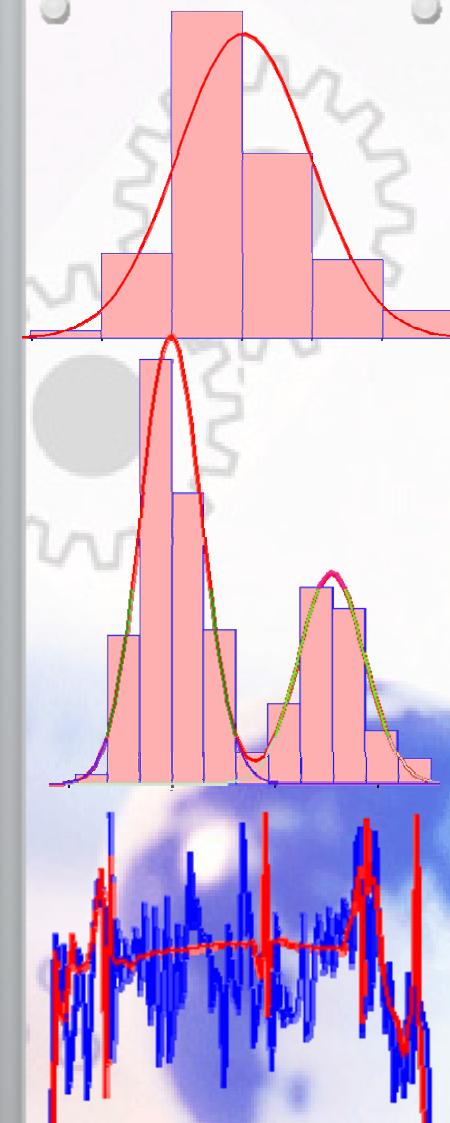
- Distribution Model Fitting
- Fourier and Wavelet Data Modeling
- Random Number Generator (any SOCR distribution)
- Graphs
- GUIs
- Web Interface

SOCR Modeler

BetaFit_Modeler
ExponentialFit_Modeler
FourierFit_Modeler
GammaFit_Modeler
MixedFit_Modeler
NormalFit_Modeler
PoissonFit_Modeler
WaveletFit_Modeler

http://www.socr.ucla.edu/htmls/SOCR_Modelet.html

http://wiki.stat.ucla.edu/socr/index.php/About_pages_for_SOCR_Modeler



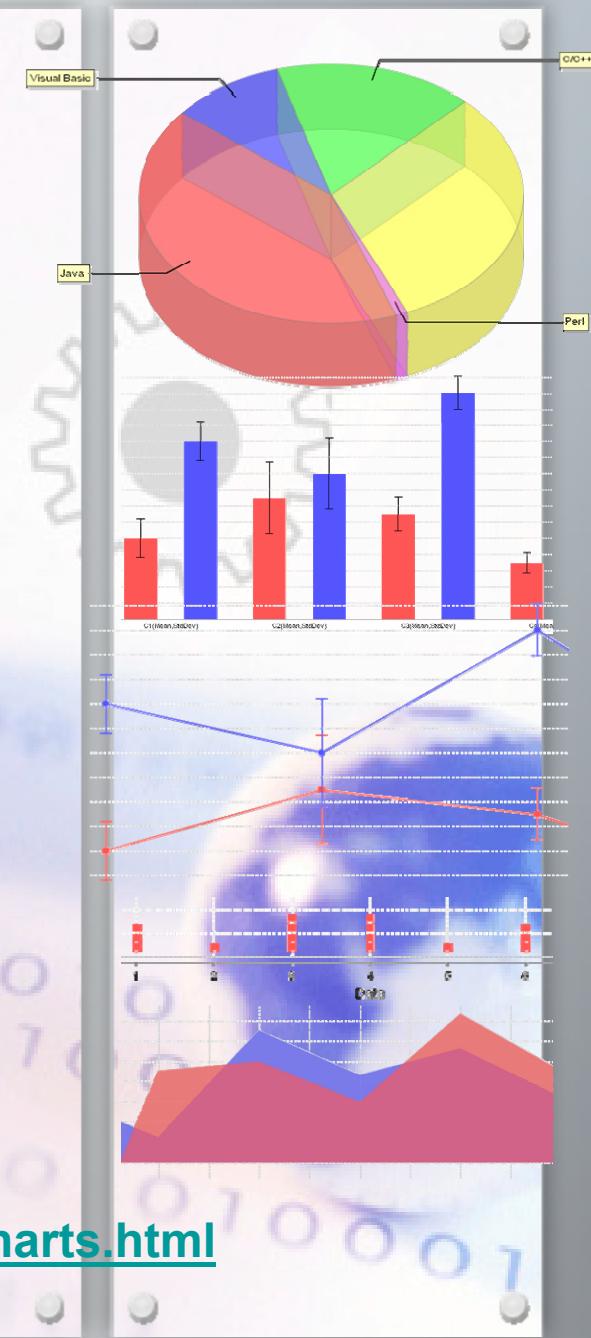
FEATURES

- 50+ Dynamic Interactive Graphs
- Summary Stats
- GUIs
- Web Interface
- Based on JFreeCharts

SOCR Charts

- └ SOCRCharts
 - └ Pie Charts
 - └ Bar Charts
 - └ Line Charts
 - LineChartDemo1
 - LineChartDemo2
 - LineChartDemo3
 - LineChartDemo5
 - LineChartDemo6
 - ScatterChartDemo1
 - DotChart
 - IndexChart
 - QQNormalDataDemo
 - QQNormalPlotDemo
 - NormalDistributionDemo
 - StatisticalLineChartDemo1
 - StatisticalLineChartDemo2
 - XYStepRendererDemo1
 - └ Area Charts
 - └ Miscellaneous

http://www.socr.ucla.edu/htmls/SOCR_Charts.html



FEATURES

- SOCR External Tools
- Web-based
- Freely available

Additional SOCR Resources

High-Precision
Distribution
Calculators

Tables

Function and
Image-
Processing
Tools

Conceptual
Demo Applets

Online Real-
Time Statistics
Data Analysis

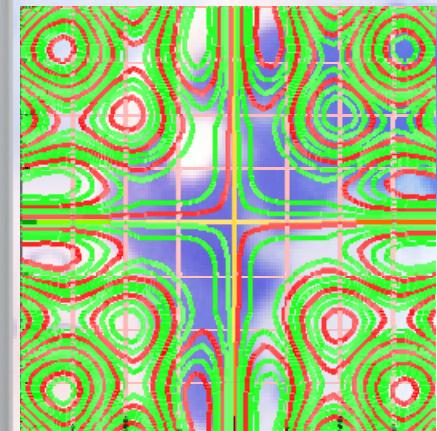
Other Online
Compute
Resources

<http://www.socr.ucla.edu/Applets.dir/OnlineResources.html>

Fisher's F Distribution

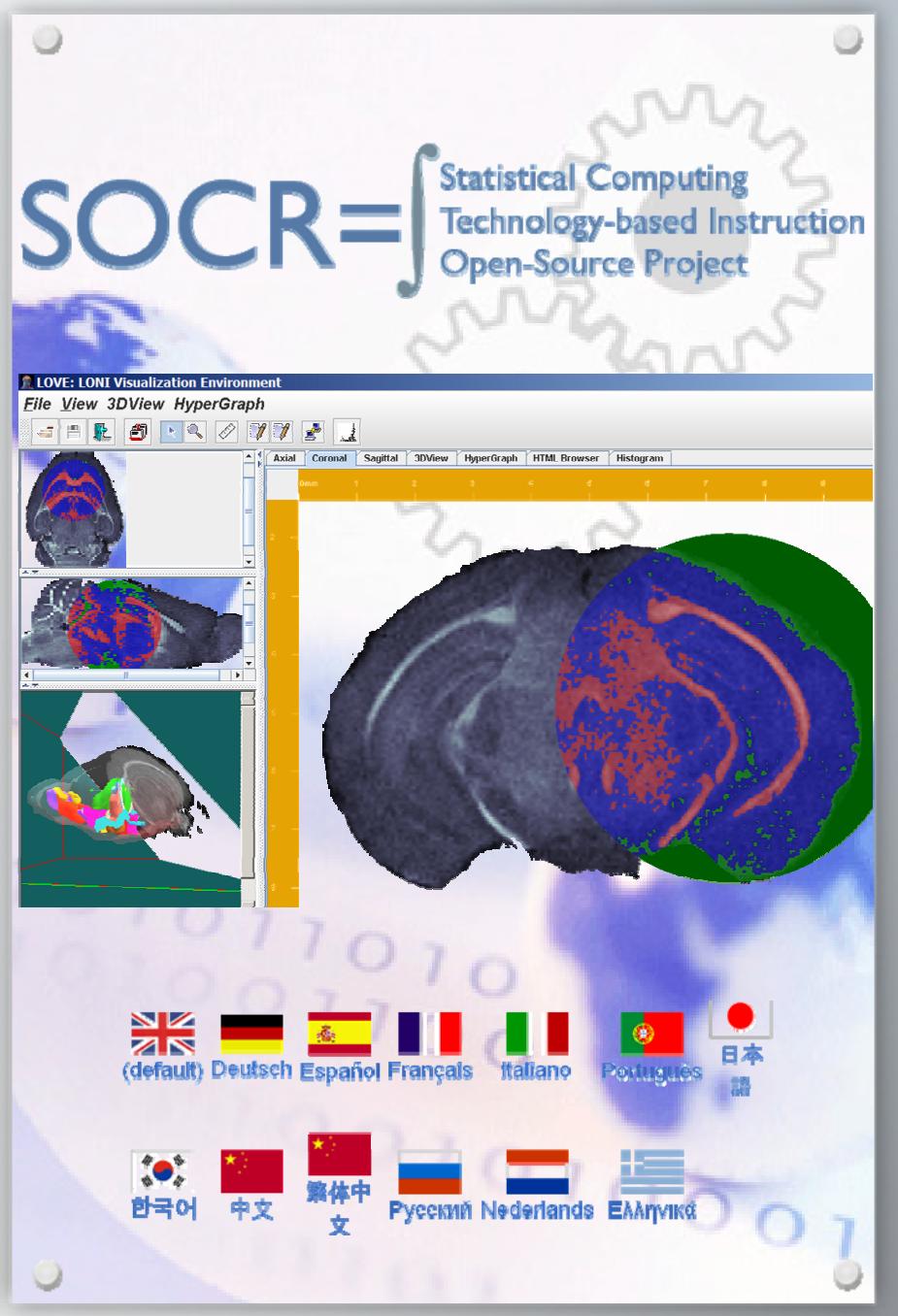
F	n ₁ (df ₁)	n ₂ (df ₂)	p (right tail)
4.56	3	5	0.06786914
Calc F			Calc p

T _{df}	$\alpha = 0.1$	0.05
∞	$t_{\alpha}=1.282$	1.645
1	3.078	6.314
2	1.886	2.920
3	1.638	2.353



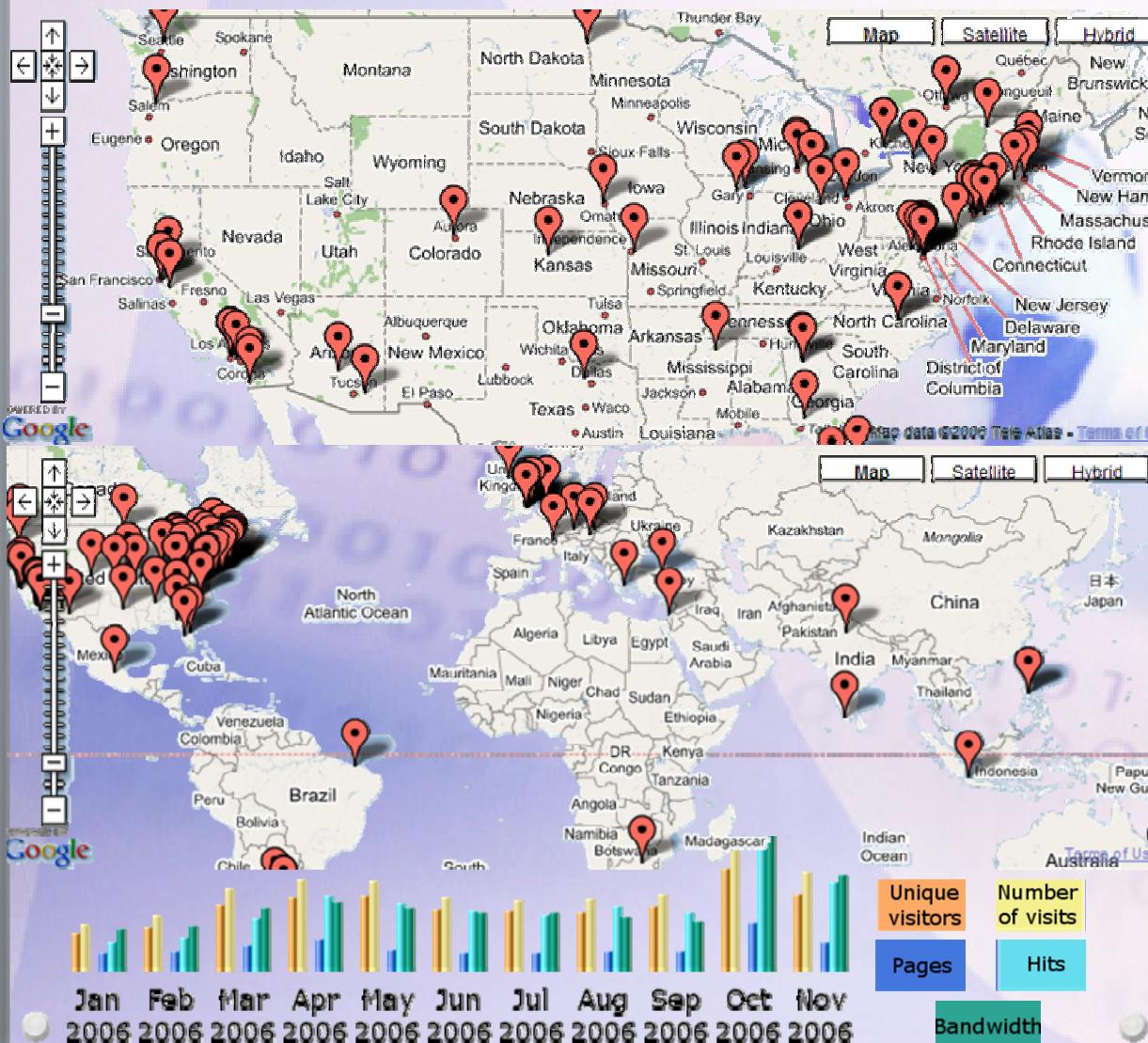
SOCR Usage

- Course instructors and teachers
 - Class notes, interactive tools & activities useful for student motivation & concept demonstration
- Students and trainees
 - SOCR class notes, analyses, computational and graphing tools for learning & practicing
- Model developers, software engineers & researchers
 - Light-weight plug-in oriented SOCR computational libraries and infrastructure useful in their algorithm designs and research efforts.



SOCR Usage

Visitor Log for **Statistics Online Computational Resource**



- > 90,000 active users (1 count/user/day)

- National and International Users

- 18% Quarterly ↑

Summary

- When:[Monthly historyDays of monthDays of weekHours](#)

- Who:[Countries Full list](#)
[Hosts Full list](#) [Last visit](#)
[Unresolved IP Address](#)
[Robots/Spiders visitors Full list](#) [Last visit](#)

- Navigation:[Visits durationFile typeViewed Full list](#) [Entry Exit Operating Systems Versions Unknown Browsers Versions Unknown](#)

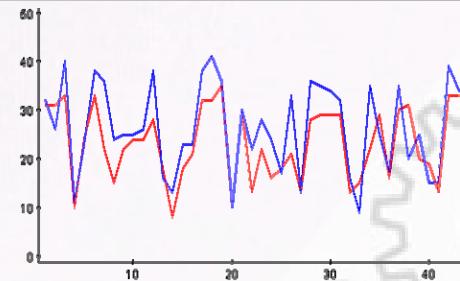
- Referrers:[Origin Referring search engines Referring sites Search Search Keyphrases Sea ch Keywords](#)

- Others:[MiscellaneousHTTP Status codes](#) [Pages not found](#)

SOCR Instruction

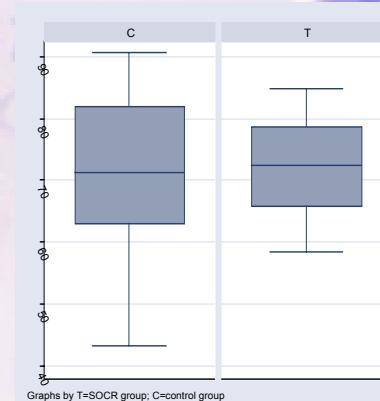
- SOCR is Tested in:
 - Lower Div., Upper Div. and Graduate Courses
 - Major, Minor and Service Courses
 - Small (<10) & Large Classes (100)
 - 20 Instructors
 - > 20 courses
 - >1,500 students
- Validated on Variety of Study Designs
 - Pooling results from 3 studies, SOCR effect $p < 0.00098$ (Dinov, Sanchez and Christou, 2006)
- Studies of student knowledge acquisition, learning-styles, attitudes towards Prob & Stats and quantitative performance (2004-2007)

http://www.socr.ucla.edu/htmls/SOCR_References.html



Demographics	Stat13 section 1 Control	Stat13 section 2 Treatment
Freshmen	24	7
Sophomores	18	14
Juniors	16	38
Seniors	23	29
Graduates	2	0
Total	83	88

	Group	High	Low	Median	Mean	Standard Deviation	Statistics
Midterm	Control	100	53	84.3	83.9	10	$t_0 = 1.37$ $t(169)$ $p=0.089$
	Treatment	100	58	88	86	10	
Final	Control	100	42	83	81.2	13	$t_0 = 1.34$ $t(169)$ $p=0.093$
	Treatment	99	35	87	83.8	12	
Overall Performance	Control	96.89	53.6	86.82	84.57	9.1	$t_0 = 1.448$ $t(169)$ $p=0.075$
	Treatment	98.05	42.32	88.26	86.68	9.9	



SOCR

Acknowledgements

- Funded by NSF DUE 0442992 &
 - NIH U54 RR021813
- Collaborators
 - N Christou, J Sanchez, R Gould
 - J Cui, A Che, A Anderson, A Toga
 - www.CAUSEweb.org consortium
- http://www.socr.ucla.edu/htmls/SOCR_Acknowledgements.html
- http://www.socr.ucla.edu/htmls/SOCR_References.html
- www.SOCR.ucla.edu
- www.StatisticsResource.org

