Welcome to a new semester! We look forward to working with you this semester. As a result of extensive work with Faculty, Staff and Students last semester regarding how to improve the classroom experience, the CSS team worked to develop a plan based on your feedback and put these plans into action during the down time between semesters.

Welcome, or welcome back, to UNT! If you’re new, or if you've just been away for a while, it is our hope that this article will serve as a handy starting point to get you acquainted (or re-acquainted) with the resources that are available to you here at the University.

Lots of EDUCAUSE opportunities await you in 2015. Connect with your peers at EDUCAUSE Connect in San Diego this month or in San Antonio in April; attend the EDUCAUSE Learning Initiative (ELI) Annual Meeting in February; plan to attend the 2015 Annual Meeting in October in Indiana. Always, of course, EDUCAUSE Live! webinars remain free and available for viewing at a time of your choosing.
Click on the link above for an information age laugh.
Welcome to a new semester! We look forward to working with you this semester.

As a result of extensive work with Faculty, Staff and Students last semester regarding how to improve the classroom experience, the CSS team worked to develop a plan based on your feedback and put these plans into action during the down time between semesters.

What improvements can you expect to see for Spring 2015?

A new website!

CSS is developing a new website with additional tools for your use: http://www.classroomsupport.unt.edu The new web page features:

- News feed where we will post classroom operating system and application update notifications so you can see what was updated of changed that week
- A room Characteristics page that will allow you to filter by classroom device type, building, etc. The intention here is to help you more quickly and easily find the classroom that suits your needs and teaching style. The room information presented to you includes, but is not limited to:
  - A picture of the room
  - Fixed or movable seating
  - Seating Capacity
  - Number of projectors
  - Presence of a visualizer
  - Room Type (general purpose classroom, class lab, etc)

CSS is migrating the old content to the new web site. Until the new site is fully populated, the old site will remain available at http://www.css.unt.edu/

Other improvements

- All CSS supported classrooms now have a CSS developed application titled "Report an Issue". This application can be located in the Quicklaunch menu on the classroom PC as well as on the Windows Task bar. This application asks you to describe the problem you are experiencing and auto routes the problem to the appropriate on-campus support group. The intention here is to alleviate you of the burden of knowing which support group to contact for which problem because the application handles that for you. Our goal...
was to streamline problem reporting in the classroom so you can spend your time focusing on instruction and let us handle the rest.

- All WolfVision document cameras have been re-calibrated and checked and corrected for factory default hardware issue. This improves ease of use and operational effectiveness.

- All CSS supported classrooms have been updated with a 64bit version of Windows 7. Enjoy the extra PC processing power.

- All CSS supported classrooms now come standard with SPSS loaded on the classroom PC.

The work cited above has already been completed at this time. However, the CSS team still has additional improvements plans in the development phase and we invite you to join us on our website whenever is convenient for you to see details as they develop.

Thank you so very much for your continued efforts to work with the CSS team.

**We welcome your feedback**

Your feedback is vital to us. We hope to see a lot of you at the next CAS discussion event (please reserve your seat with Linda Masters so we can ensure there is room for all participants):

- February 11th 2015 2:00pm - 3:00pm in chem109
- February 12th 2015 2:30pm - 3:30pm in chem106

This event is a discussion style format hosted by CAS. Classroom Support Services will be present to listen to your concerns, ideas for improvement, or answer any questions you might have.

**Contact us**

Thank you and feel free to contact us if we can be of any assistance:

Monday thru Friday 7 a.m. - 11 p.m.
940-565-2691
ClassroomSupport@unt.edu
Chilton Hall 243

**Originally published January 2015** -- Please note that information published in *Benchmarks Online* is likely to degrade over time, especially links to various Websites. To make sure you have the most current information on a specific topic, it may be best to search the UNT Website - [http://www.unt.edu](http://www.unt.edu) - You can also consult the UNT Helpdesk - [http://www.unt.edu/helpdesk/](http://www.unt.edu/helpdesk/). Questions and comments should be directed to benchmarks@unt.edu.
Information Technology Resources at UNT - Finding Your Way Around

By Claudia Lynch, Benchmarks Online Editor

Various versions of this article are published each semester. -- Ed.

Welcome, or welcome back, to UNT! If you're new, or if you've just been away for a while, it is our hope that this article will serve as a handy starting point to get you acquainted (or re-acquainted) with the resources that are available to you here at the University.

Students, faculty and/or staff members should all benefit from the information that follows.

Many IT services at UNT are brought to you by University Information Technology (UIT). UIT consists of local IT services associated with the UNT flagship campus. These are Academic Computing and User Services (ACUS), Administrative Information Technology Services (AITS), Classroom Support Services (CSS), and Microcomputer Maintenance Services (MMS). System-wide IT services are provided by Information Technology Shared Services (ITSS).

When all else fails ...

If you have an IT question and/or problem and can't think of who to contact or where to look for a solution, just remember this: Contact the Helpdesk

The University Information Technology (UIT) Helpdesk is located in room 130 of Sage Hall. Their hours are listed on the Helpdesk website: http://helpdesk.unt.edu/. Besides stopping by or searching for answers on the website, you can call the Helpdesk at 940-565-2324 or send mail to helpdesk@unt.edu.

Speaking of the Helpdesk, Benchmarks Online, publishes a column each month called "Helpdesk FYI." This month's article is Filtering your UNT Email. Following is a selection of articles published within the past year. Perhaps one of these topics is something you've been wondering about:

- How to tell if your account is locked
- The Knowledge Center at UNT's new IT Help Self Service Portal
- Web-Based Printing in the Sage Hall Lobby
- UNT wireless network connection
- Office 365 ProPlus now available to all current students through EagleConnect!
- Campus VPN
- Be Safe Out There
- OneDrive and Office Web Apps

Also, you can look back through the Benchmarks Online archives for more articles that may be of interest to you.

We hope that new students are familiar with the Student Tour of Computing Services at UNT. There are lots of topics touched on that are of interest to non-students also. For Example, in the Documents About Student Computing Services area are PDF files of things like a Computer Security brochure and a Student Computer Labs brochure. Check out the complete website: it.unt.edu/studenttechtour.
Student Computer Labs System

The UNT Student Computer Labs System (SCL) is a collection of 13 computer labs spread across the UNT Denton campus. They have been set up to provide computing to the University community. The SCL website states:

The labs are intended to meet the general academic computing needs of UNT students. These labs are supported and maintained primarily through a portion of the Technology Use Fee.

Students with a valid UNT photo ID card may use any Student Computer Lab except where noted.

A list of labs and their locations and operating hours is available from the SCL website. The lab in SYMR 104 is an Adaptive Lab. As the website states:

The University of North Texas Academic Computing Services General Access Lab is located in Sycamore Hall, Room 104. The mission of this lab is to provide general services to the UNT community with an emphasis on the special features that Academic Computing Services has to offer including helpdesk support and research assistance. Additionally the ACS lab is the designated adaptive lab on campus providing state-of-the-art adaptive equipment for those who need it. For more information about adaptive services on the UNT campus visit the Office of Disability Accommodation at http://www.unt.edu/oda.

Computer Based Training

Rising costs of training, shrinking budgets and changing technology have contributed to changes in computer-based training offerings at UNT over the last several years. The monthly "Training" column in Benchmarks Online has a list of training resources currently available to the UNT community. This month's column is here. Contact Claudia Lynch if you have questions or need more information about these resources.

Online Learning

For students, a good starting place is found on the student tour. Faculty will want to visit the Center for Learning Enhancement, Assessment, and Redesign (CLEAR) website and/or the Center itself.

Other Items of Interest

- Videoconferencing -- Videoconference Technology allows you to meet with your colleagues on campus, at the Dallas and Ft. Worth campuses, or almost anywhere in the world. See the Benchmarks Online article "Save Time, Money, and Avoid Parking Frustrations Using Videoconference Technology" for further information.

- Ask Us -- The UNT Libraries' virtual/online help services; they're available from your computer 24/7.

- Info~Tech -- Info-Tech Research Group (Info~Tech) is the Information Technology (IT) research partner for the UNT System. All faculty, staff, and students system-wide have access to Info-Tech research at: www.infotech.unt.edu (select the UNT System name to login).

- Campus Subscription to Higher Education Newsletters-- UNT has negotiated a group online subscription allowing campus members free access to the Distance Education Report, Online Classroom, and The Teaching Professor higher education newsletters produced by Magna Publications. To access these publications, go to http://www.magnapubs.com/publications/newsletters/ and click on the "Group Account" tab at the top of the page. No password is necessary to access these publications from a campus computer. If you wish to access from off campus or if you would like to receive an email message each time a new issue is posted, you will need to register and enter a campus voucher code and pin number. Please email jane.himmel@unt.edu to obtain this information.

- Statistical and Research Support Services -- "The mission of the Research and Statistical Support (RSS) group at the University of North Texas (UNT) is to facilitate access to current research tools and statistical methodologies and to promote these methods to the research, instructional, and administrative communities at UNT; to encourage a collaborative research environment for researchers through the development and use of innovative computing technologies; to provide training and consultation in the appropriate use of statistical methodologies and computer software; and to facilitate access to data collection and data management technologies." [From the Research and Statistical Support website]. The RSS Group publishes a monthly column in Benchmarks Online. You can find their brochure here.

- LISTSERV.UNT.EDU -- LISTSERV web interface makes it much easier to manage your listserv lists. See this past Benchmarks Online article for more information.

- Data Management Services - Location: Sage Hall, Room 336, near to the Sage Hall elevator. For more information contact: Joann.Luksich@unt.edu 940.369.7416 Services include:
Exam Grading and Analysis

Research Projects - Data Collection

Scannable Survey Design

Faculty Evaluation Processing: Scan, edit and process UNT departmental faculty evaluations. Standardized reports provided: Department Overall, By Instructor-Course-Section, and By Instructor. An Excel data file will be provided to run any customized reports desired. See the "Faculty Evaluation Processing Tips" for more information.

- High-Performance Computing Initiative - The High-Performance Computing Initiative is available for use by UNT researchers whose research or scholarship requires use of computationally-intensive applications. Visit the HPC website for further information. See also this article in Benchmarks Online: High Performance Computing: Talon 2.0.

- Information Security -- "The Information Security Team helps protect UNT Information Technology assets from misuse, abuse, and unauthorized access. The mission of the Information Security Team is to assist and collaborate with UNT administrative, academic, and student communities to help assess, implement, and maintain information security needs." [From the Information Security Website]. Links and further information can be found at that site. UNT Faculty, Staff, and Students are required to read the Security Handbook.

  Information Security has an announcement board on UNTRANET to post important security updates/alerts as an additional security resource. See this past Benchmarks Online article for further information on the announcement board.

- Managing Spam -- Actively manage e-mail that is sent to your campus e-mail address. See the article Managing Your Spam for more information.

- Campus VPN -- The Campus VPN is an interface that will allow you to connect remotely to on-campus resources. For more information click here.

- Free or cheap software
  - McAfee VirusScan 8.8i -- Free download.
  - Free MS Office Web Apps and Office 365 ProPlus -- More information here.
  - OnTheHub -- All UNT and UNT System community members have access to this site for the purpose of purchasing discounted software. This includes Adobe's "Master Collection" and "Design & Web Premium" suites. For an overview of software availability for faculty, staff, and students from October, 2014 click here.

  Microsoft Campus Agreement -- UNT has had an agreement with Microsoft for a number of years that allows us to distribute various Microsoft products to employees of the University. According to the agreement, you can "use the software for school-related purposes on a personally-owned computer or an institution-owned computer designated for your exclusive use" and you must remove the software from your home machine if you leave UNT. This agreement does not cover students unless those students are also UNT employees. UNT Health Science Center employees CAN purchase their software on the HSC campus via the ITS Helpdesk. Employees wishing to install these products on University-owned computers should contact their Network Manager for further instructions.

  - The Microsoft Home Use Program -- Reduced price software for faculty/staff home use. Visit the Home Use Program website to participate in the program. You will need to contact Claudia Lynch at Lynch@unt.edu if prompted for a program code.

  - DreamSpark -- UNT students (currently only BCIS, DSCI, MSCI, and Computer Science and Engineering students) can take advantage of DreamSpark, Microsoft's program that provides free development software to students. Click here for more information.

  - Free/Open Source Statistical Software: http://www.unt.edu/rss/software/software.html
EDUCAUSE Opportunities in 2015

By Claudia Lynch, Benchmarks Online Editor

Lots of EDUCAUSE opportunities await you in 2015. Connect with your peers at EDUCAUSE Connect in San Diego this month or in San Antonio in April; attend the EDUCAUSE Learning Initiative (ELI) Annual Meeting in February; plan to attend the 2015 Annual Meeting in October in Indiana. Always, of course, EDUCAUSE Live! webinars remain free and available for viewing at a time of your choosing.

January 28–30, 2015
San Diego, California

EDUCAUSE Connect: San Diego takes the concept of professional development events to a personal level through active dialogue and collaborative efforts to solve, network, and grow.

ALSO: April 22–24, 2015
San Antonio, TX

February 9–11, 2015
Anaheim, California, and Online

Designing our Thinking: Crafting New Directions for Digital Engagement is the theme of the EDUCAUSE Learning Initiative Annual Meeting 2015 in Anaheim, California, and online. ELI's annual meeting is the premier event for those committed to the advancement of learning through the innovative application of technology.

Early-Bird Discount
Deadlines: Virtual Meeting: February 3
View the face-to-face or
Memories of the 2014 Annual Conference in Orlando, Florida linger, but it is time to think about next year's Annual Conference. Read all about it [here](http://it.unt.edu/benchmarks/issue/2015/01/educause-opportunities-2015)! **Proposal Deadline:** extended to January 21, 2015

And there are always [EDUCAUSE Live!](http://it.unt.edu/benchmarks/archives) Webinars

**EDUCAUSE Live!** is a series of **free**, hour-long interactive webinars on critical information technology topics in higher education. You can **register** for upcoming webinars and you can find recordings of all past **webinars** in the [EDUCAUSE Live! archives](http://it.unt.edu/benchmarks/archives).

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**UNT System:**
- [UNT Home](http://it.unt.edu/)
- [UNT System](http://it.unt.edu/)
- [UNT Dallas](http://it.unt.edu/)
- [UNT Health Science Center](http://it.unt.edu/)

**Site last updated on April 22, 2016**

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Network Connection

By Dr. Philip Baczewski, Senior Director of Academic Computing and User Services and Deputy Chief Information Officer for University Information Technology

What's Your Password? Don't Answer that Question!

The news is out. In case you were wondering, the most popular password used in 2014 was "123456" followed by "password" and "12345" (sounds like a password you’d use on your luggage.) These were reported to have been compiled from leaked passwords by a company named SplashData that markets a password manager program. The list illustrates a long-standing paradox with passwords: to be effective, passwords need to be complex unrecognizable patterns, but to be memorable, passwords need to be simple and familiar words or numbers.

The longer we inhabit the Internet, the more passwords we are asked to create and maintain. E-commerce sites like Amazon, online subscription services, e-mail accounts, and many other online locations that support our daily activities all expect a username and password in order to provide access. And our ability to avoid passwords is becoming more and more restricted. We have to use passwords to access systems at work, many of our service providers, like health care and insurance, are moving to online systems because of the efficiency of such interactions, and more of our entertainment options are being delivered via the Internet. Add to this the fact that using the same password for multiple services is a really bad idea, and remembering all of those values can be quite a challenge.

Advice about passwords can be confusing and conflicting as well. There's the cartoon that tells us that a plain series of random words is more secure than a complexly-constructed password that has numbers and punctuation substituting for letters. Then there’s the article that tells us why the cartoon was all wrong about selecting a password. And then there are the folks that tell us that we shouldn't have passwords at all. The cartoon has a good point: we've been trained "to use passwords that are hard for humans to remember, but easy for computers to guess". The refuting article points out that passwords should be evaluated on their "frequency of appearance" rather than their susceptibility to being "cracked". And those declaring passwords should be dead often encourage use of multi-factor authentication or password managers.

Creating good passwords

There are plenty of articles about creating good passwords and most of the advice remains the same. Don't use obvious or familiar words or phrases like "password" or even "P@ssw0rd!". Don't use personally identifiable information, like birthdays or pet names, as your password. The most commonly recommended approach still is to select a phrase you can remember and use the first character of each word to form the password value, with number or punctuation substitutions if required. To support easier recall, associate the password with the site you are accessing in a way that is not obvious to anyone but you. For example, you might think of the home improvement store as "Everything I need to fix things around the house". This could become "Ein2ftath". However, the phrase needs to be obvious enough to you that you will remember it, especially, if you don't visit a site very often.

Mum's the word!
Finally, remember that a password is not secure unless it is a secret. In the IT support business, we often tell folks that we'll never ask for your password, and you should never reveal your password even if asked by someone who appears to be support personnel or an authority figure. The easiest way for a hacker to get your password is for you to tell them what it is or how you created it. This has even been exploited recently for its entertainment value on a late-night talk show. And another piece of advice -- don't use the same password for your bank account as you use for your luggage.

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Link of the Month

Feeding the Eagles: UNT's student food pantry

The University of North Texas is taking action to address food insecurity among its students. So begins the description of a new effort by the Dean of Student's office. According to the website, linked below, "Dean of Students Office has established a pantry that will provide an accessible source of food for students in need. Managed by the Dean of Students Office, the food pantry is scheduled to launch with the start of spring semester. The pantry will be housed in Stovall Hall, but will relocate to the Union once it opens. Staff and volunteers will protect the confidentiality of students and will serve as a referral source to other campus and community resources." An article about the food pantry appeared in the latest issue of The North Texan.

https://deanofstudents.unt.edu/food_pantry

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Help Desk FYI

By Jacob Flores, UIT Support Services Manager

Filtering your UNT Email

The UIT Helpdesk gets a number of questions from users regarding how to filter all of the UNT Email received in their EagleConnect account based on category.

UNT Bulk Mail Message Types

Mail sent from the University Bulk Mail system will use the following key words in the subject line:

"UNT Official Message:" for UNT official notices and announcements
"UNT Announcement:" for general announcements and event notifications
"UNT Course Info:" for course-related information from professors

Creating Rules

To create a rule to organize Bulk Mail messages, or other emails, use the following steps:


2. Click on the gear icon near the top-right and select Options.

3. From the menu on the left, select Inbox Rules and click on the + icon.

4. Create a friendly name for the inbox rule.

5. From the "When the message arrives, and *" section choose It includes these words in the subject... from the dropdown menu.

6. A window will appear. Type in the specific phrase you want to filter on. For this example we will use "UNT Announcement:"

7. After entering in your phrase click the plus + sign, and then click OK. If you wish to add more values simply enter them in and use the + sign to add them to your list.

8. Under the "Do the following *" section, choose what you would like to do with the message. For our example we will Move the message to folder...

9. After choose Move the message to folder... click on the *Select one... option.

10. If you have previously created a Folder you wish to use select it now, otherwise use the New Folder option. For our example I will click on New Folder and label it Announcement. Then click OK.

11. Choose Save.

With these settings, messages that contain "UNT Announcement" in the subject line should be directed to your Announcement folder.

You can create similar rules for the other UNT Bulk Mail categories listed above.

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*This is an update for the following article: http://it.unt.edu/benchmarks/issues/2013/04/helpdesk-fyi
Explicit Bayes: Working Concrete Examples to Introduce the Bayesian Perspective.

Link to the last RSS article here: Identifying or Verifying the Number of Factors to Extract using Very Simple Structure. -- Ed.

By Dr. Jon Starkweather, Research and Statistical Support Consultant Team

We use the term *explicit* because we are going to calculate these examples *by hand* with programming rather than simply loading a package and using functions to estimate parameters. The purpose of using these explicit methods is to hopefully convey a better understanding of what it means to do Bayesian statistics.

First, we must present a little bit about Bayesian statistics. Very, very briefly, Bayesian statistics requires three elements: a prior, likelihood, and a posterior. The prior is a distribution specified by the researcher which represents all prior information regarding the parameter the researcher is attempting to estimate. The prior represents an educated, best guess at the parameter (e.g., the mean of the prior) and the degree of certainty or confidence in that educated, best guess (e.g., the variance and shape of the prior distribution). The prior is specified before (i.e. *prior*) to data collection. The prior is then combined with the likelihood (a representation of the data at hand) to create a more informed, empirical distribution of the parameter being estimated. We call this last distribution the *posterior* distribution. The mean of the posterior is our estimate of the parameter. Interval estimates can then be calculated from the posterior which truly will represent the interval which contains the actual population parameter; we call those intervals, *credible intervals* (rather than confidence intervals – which do not tell you the probability of the population parameter being contained in this interval).

Let’s say we want to estimate the mean IQ scores on the Weschler Adult Intelligence Scale (WAIS) of a small town, X.Town, which has a population of 10000 individuals. Let’s start by importing the X.Town data.

```r
x.town.df <- read.table("http://www.unt.edu/rss/class/Jon/ExampleData/X.Town.sample.txt", header = TRUE, sep = ",", dec = ".", na.strings = "NA")
```

```r
nrow(x.town.df)
[1] 10000
```

We know from a mountain of normative data and prior research that the U.S. population distribution of WAIS scores has a mean (µ) of 100 and a standard deviation (σ) of 15. This information represents a best case scenario; where we *know* the population distribution and that distribution is normally distributed with an identified mean and standard deviation. Generally, we would not have such great prior information; so consider an alternative where we have virtually no prior information accept to know the WAIS questions / procedures which allow a possible score to range from 1 to 200. In such a case, our specification of a prior distribution would mean each score in that range is equally likely -- which prompts us to specify a *uniform* distribution (i.e. a distribution in which each value has an equal probability of being represented). A uniform prior is also known as an un-informative or un-informed prior. In both examples below we are using a population of 10000 individuals.
uninformed.prior <- rep(seq(1:200), 50)
length(uninformed.prior)
[1] 10000
summary(uninformed.prior)
    Min.  1st Qu.   Median     Mean  3rd Qu.    Max.  
    1.00   50.75  100.50  100.50  150.20  200.00
hist(uninformed.prior)

However, with the WAIS and the knowledge of the U.S. population, we can specify a Gaussian (i.e. normal) distribution as our prior.

informed.prior <- rnorm(10000, mean = 100, sd = 15)
length(informed.prior)
[1] 10000
summary(informed.prior)
    Min.  1st Qu.   Median     Mean  3rd Qu.    Max.  
    37.51   89.93  100.10  100.10  110.40  157.30
hist(informed.prior)
Clearly; the two example priors above are extremes (i.e. worst case and best case); there are a variety of other distributions which can be specified as priors (e.g. Cauchy, Poisson, beta, etc.) and the prior is not required to be symmetrical. For more information on the variety of distributions, see: http://en.wikipedia.org/wiki/List_of_probability_distributions

Our research questions are as follows: What is the mean WAIS score of the population \( (n = 10000) \) of X.Town; and, does that mean differ from the larger (U.S.) population? In more precise terms, what is the population mean of X.Town WAIS scores and is that mean larger than the known U.S. population mean. To be clear, there are two populations we are referring to here; the population of X.Town \( (N = 10000) \) and the larger population of the U.S.

It is unrealistic to think we would have all 10000 adult citizens' data from X.Town; we would generally have a sample of that town's data. Note; the 7th column of our X Town data file contains the WAIS scores. Here we randomly sample \( (n = 1000) \) cases from the entire X.Town data \( (N = 10000) \):

```r
wais.sample <- sample(x.town.df[,7], 1000, replace = FALSE)
length(wais.sample)
[1] 1000
```

**Traditional Frequentist Perspective: Null Hypothesis Significance Testing (NHST).**

In a traditional frequentist setting, we would begin by simply calculating the sample mean as our best estimate of the entire X.Town population mean WAIS score:

```r
M <- mean(wais.sample)
M
[1] 107.6305
```

and the standard error of that mean if we wanted confidence intervals for that estimate (of the entire X.Town's mean):

```r
std.err <- sqrt(15^2 / length(wais.sample))
std.err
[1] 0.4743416
```

Then using an alpha value (e.g. 0.05) look up the associated critical value (i.e. +/-1.96) in a table; then calculate the lower and upper bounds of the confidence interval for our estimate (i.e. the confidence interval for the estimated mean of X.Town).

```r
lower.bound <- (-1.96*std.err) + M
```
Then, we would run a one sample t-test using our random sample of X.Town adults’ WAIS scores, comparing the mean of the sample scores ($M$; as our best estimate of the entire X.Town's mean) to the mean of the U.S. population ($\mu_0$; $\mu$); using the standard error of the mean ($\text{std.err}$) and some pre-designated probability cutoff (e.g. 0.05) to determine statistical significance.

```r
t.test(wais.sample, alternative = 'greater', mu = 100, conf.level = .95)
```

One Sample t-test

data:  wais.sample

t = 17.0653, df = 999, p-value < 2.2e-16
alternative hypothesis: true mean is greater than 100

95 percent confidence interval:
  106.8944      Inf
sample estimates:
mean of x
  107.6305

It is important to recall (or review) what the above test is doing. We have drawn a random sample of data from X.Town and we are testing the mean of that sample against a known (U.S.) population mean to determine if the sample indeed comes from that population (i.e. the null hypothesis). Notice we are using the sample mean ($n = 1000$) as a representation of the entire X.Town’s WAIS scores ($N = 10000$).

**Bayesian Perspective: Bayesian Statistics; Bayesian Inference; Bayesian Parameter Estimation.**

All three of the above terms are often used to refer to Bayesian data analysis. The examples below were all adapted from Kaplan (2014). Our example explores the normal prior for the normal sampling model in which the variance $\sigma^2$ (sigma squared) is assumed to be known. Thus, the problem is one of estimating the mean $\mu$ ($\mu_0$). Let $y$ denote a data vector of size $n$ ($y = \text{the sample of 1000 WAIS scores}$). We assume that $y$ follows a normal distribution shown with the equation below:

$$p(y|\mu, \sigma^2) = \frac{1}{\sqrt{2\pi\sigma^2}} \exp\left(-\frac{(y - \mu)^2}{2\sigma^2}\right)$$

To clarify and show an example in R, we use the following:

```r
mu <- 100
o <- 15
y <- wais.sample

output <- (1/sqrt(2*pi*o)) * exp(-((y - mu)^2) / (2*o^2))

summary(output)
```

Min. 1st Qu.  Median     Mean 3rd Qu.    Max.
0.000289 0.047630 0.078600 0.069690 0.096360 0.103000

Next, we specify the prior. We have plenty of confidence that our prior distribution of the mean is normal with its own mean and variance hyper-parameters, $k$ and $t^2$ (using $t$ in R code to refer to tau: $\tau$), respectively, which for this example are known. The prior distribution can be written as:

$$p(\mu|k,t^2) = \frac{1}{\sqrt{2\pi p^2t^2}} \exp\left(-\frac{(\mu - k)^2}{2p^2t^2}\right)$$

The term, $p(\mu|k,t^2)$, can be read as the probability of $\mu$ given $k$ and $t^2$. $k$ < - mean(y); k
t <- sd(y); t
n <- length(y); n

prior.mean <- (1/sqrt(2*pi*t^2)) * exp(-((mu - k)^2) / (2*t^2))

Combine the prior information with the likelihood of the data (given the population variance; $\sigma^2$ and the sample size $n$) to create the posterior distribution. Using some algebra, the posterior distribution can be obtained as:

\[
p(\mu|y) \sim N\left( \frac{ (k/t^2) + (n*\text{mean}(y)/\sigma^2) }{ (1/t^2) + (n/\sigma^2) } , \frac{ t^2*\sigma^2}{\sigma^2+(n*t^2)} \right)
\]

Thus, the posterior distribution of $\mu$ is normal with a mean:

\[
\text{posterior.mu} <- \left( \frac{ (k/t^2) + (n*\text{mean}(y)/\sigma^2) }{ (1/t^2) + (n/\sigma^2) } \right)
\]

and variance:

\[
\text{posterior.o2} = \frac{ t^2*\sigma^2}{\sigma^2+(n*t^2)}
\]

So, the posterior distribution can be simulated using these two parameters (and $n = 1000$); which in R, should be:

\[
\text{posterior} <- \text{rnorm}(n = \text{length}(y), \text{mean} = \text{posterior.mu}, \text{sd} = \text{sqrt}\text{posterior.o2})
\]

In a traditional frequentist analysis, one would be required to report both the estimated mean (i.e. mean of the sample) and a confidence interval with lower and upper bounds of that mean. However, a frequentist confidence interval only tells us; if this same study was repeated 100 times, we would expect the sample mean to be between the upper and lower bounds 95 times (if using a 95% confidence interval). It does not tell us the probability of the population parameter being included in the interval. Here in the Bayesian setting, we use the posterior distribution
and simply take the quantiles (i.e. probabilities) to compute the lower and upper bounds of a credible interval – which does give us the probability that the actual population parameter is included in this interval.

\[
\text{quantile(posterior, c(.05,.95))}
\]

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>5%</td>
<td>95%</td>
</tr>
<tr>
<td>106.8662</td>
<td>108.4625</td>
</tr>
</tbody>
</table>

It is critically important to recognize, the above example is only interested in estimating the mean of X.Town's WAIS scores. The example is NOT attempting to estimate the entire X.Town's distribution of WAIS scores. So let's compare the actual mean of X.Town's WAIS scores to the sample mean, and the mean of the posterior distribution (of course, in a real research situation you would not have the 'actual' parameter -- i.e. mean of the entire population of X.Town).

\[
\text{mean(x.town.df$wais)}
\]

```
[1] 107.8662
```

\[
\text{mean(wais.sample)}
\]

```
[1] 107.6305
```

\[
\text{mean(posterior)}
\]

```
[1] 107.6389
```

Undoubtable readers will notice the virtually identical estimates provided by the mean of the posterior (i.e. Bayesian estimate) and simply the mean of the sample (i.e. frequentist estimate); and both of those are very, very close to the X.Town population mean. There are two very important reasons for this. First, the Bayesian and Frequentist methods will result in virtually the same parameter estimate(s) with large samples. The prior is weighted very lightly and the likelihood (a representation of the data at hand) contributes the bulk of the weight to the estimation when large samples are used in a Bayesian analysis. Second, the data used in the examples above is simulated data and a truly random sample (\(n = 1000\)) was taken from the entire population (\(N = 10000\)). Therefore, our results here have very low bias as a result of the truly random sample and the fact that 10% of the population was contained in the sample. Most research is not conducted on a truly random sample and very few research endeavors include 10% of the population as the sample.

Lastly, hypothesis testing and statistical significance are not foreign to the Bayesian perspective. For example, if one were interested in conducting a Bayesian t-test, you would use something called Bayes Factors which has been covered on the RSS Do-it-yourself Introduction to R web site and specifically here in Module 11. Bayes Factors were also discussed in a previous RSS Matters article (Adobe.pdf version).

Until next time, “knowledge is freedom and ignorance is slavery.”

-- The above quote is attributed to Miles Dewey Davis III (1926 – 1991):

http://www.goodreads.com/author/quotes/54761.Miles_Davis

Highly Recommended Reference


Other Important Resources


Training

By Claudia Lynch, Benchmarks Online Editor

Do you need training on widely used computer programs including those used in statistical analysis? If so, this monthly Benchmarks Online column is for you.

Statistical Analysis

Instructor-led courses are offered only by special request. Please contact an RSS member or Claudia Lynch if you are interested in taking such a class or wish to have someone offer a class for your students. SAS, SPSS and Introduction to R are offered online. Make sure and check out the recent RSS Matters article Statistical Resources (update; version 3).

Special classes can always be arranged with the RSS staff. Also, you can always contact the RSS staff for one-on-one consultation. Please read the FAQ before requesting an appointment though.

Especially for Faculty and Staff Members

In addition to the online statistical courses, which are available to students, faculty, and staff, staff and faculty members can take courses offered through the Business Service Center, and the Center for Learning Enhancement, Assessment, and Redesign (CLEAR). Additionally, the Center for Achievement and Lifelong Learning (CALL) offers a variety of courses, usually for a small fee.

UNT System Training Resources

Visit my.unt.edu and login to access tutorials.
Microsoft Virtual Academy

Who is eligible to participate in MVA?

- Anybody interested in growing their career can be a part of MVA.
- To sign up for MVA, on the MVA home page, MVA courses and events are free, but you need to identify yourself using a Microsoft account in order to sign up for MVA and create your MVA profile.
- There is no minimum level of technical expertise required.

Microsoft E-Learning

Microsoft E-Learning courses are available for faculty, staff, and students via our UNT System Microsoft Campus Agreement. Instructions for accessing Microsoft E-Learning have recently changed.

Follow the instructions below to access E-learning until you arrive on the "UNT System authenticated service Page."

- Go to: https://onlinelearning.microsoft.com

- Click Sign In:

  A whole new kind of learning.
  It goes where you go.

- Then choose:

  Organizational account
  Sign in with the account provided by your work or school to use with Office 365 or other Microsoft services.

- You will be taken to the following sign in page:

  Sign in with your organizational account

  someone@example.com

- Fill in your UNT email address on the sign in page and press the "Sign In" tab.

- You will be taken to the UNT System authenticated service Page:
To login using Integrated Authentication, click on that link and type UNT\EUID where EUID is your EUID. This should take you to the UNT courses that are available. If you are using Internet Explorer the following box will appear and you should enter your EUID where it says "Username."

Once signed in, you should be able to access the courses that are available to the UNT community.

You can access courses available to the general public by choosing the Microsoft Account option:

Microsoft account

Sign in with the account you use for OneDrive, Xbox Live, Outlook.com or other Microsoft Services.

If you do not currently have a Microsoft account (previously called a "Live ID") you can create one at Microsoft's Live Sign-up site.

Microsoft E-books

Click on the link and access the largest collection of FREE Microsoft eBooks ever, including: Windows 8.1, Windows 8, Windows 7, Office 2013, Office 365, Office 2010, SharePoint 2013, Dynamics CRM, PowerShell, Exchange Server, Lync 2013, System Center, Azure, Cloud, SQL Server, and much more!

NOTE: How to enable 'Download All' for Free Microsoft eBooks and other tips

Central Web Support

Central Web Support provides "web hosting and support to appropriate campus entities free of charge."

CLEAR

CLEAR offers courses especially for Faculty Members. CLEAR training includes:

- Blackboard
- Turnitin
- Turning Point
- Assessment
- Teaching Effectiveness
- Respondus

Please check out CLEAR’s training and event calendar at [http://clear.unt.edu/calendar](http://clear.unt.edu/calendar) for the latest information regarding Blackboard, CLEAR’s initiatives, and on campus instructional events.

Further information can be found [here](http://clear.unt.edu/calendar).

**FREE Online Learning Consortium Workshops**

The University of North Texas is a premium member of the Online Learning Consortium (formerly the Sloan Consortium) College Pass. To request FREE ENROLLMENT in an Online Learning Consortium workshop, please contact Amber Bryant with the name and date of the workshop selected.

- Online Consortium 2015 Workshops

*Please click on the link above to see the available 2015 workshops.*

CLEAR also provides free access through group subscriptions for ALL Denton UNT faculty and staff to The Teaching Professor and Online Classroom. Distance Education Report is now available also.

**Ed2go**

Ed2go are courses that are offered, for a fee, to UNT faculty, staff and students as well as the general public. According to the CALL [website](http://clear.unt.edu/calendar):

CALL has partnered up to provide online learning on a variety of topics. From standardized test preparation to database programming to training for libraries and their staff, there’s a variety of areas from which to choose in online learning.

The online minicourses, provided in conjunction with Ed2go, are standardized 12-lesson modules released over a six week period. (Courses are active for eight weeks to provide some flexibility). Each module features a quiz. Lessons are instructor-led and course participants and instructor communicate through a course discussion board. Lessons can be downloaded and saved. At the end of the course there is a final quiz. A passing grade opens a window that allows students to print out a course completion certificate.

Most courses are $89, and UNT faculty, staff and students may receive a $10 discount. Visit the online courses page at [http://www.ed2go.com/unt/](http://www.ed2go.com/unt/) or contact Tami Russell at 940.565.3353 for more information.

For additional information, visit the [Ed2go blog](http://clear.unt.edu/calendar) here. You can subscribe to their newsletter also from a link at the bottom of the page.

**Information Security Awareness**

Information Security Awareness -- The ITSS Information Security team offers Information Security Awareness training to all UNT faculty and staff.

- It is a policy requirement that ALL staff take an information security course at least once a year.

- See the [Virus Information Page](http://clear.unt.edu/calendar) and the [Information Security Handbook -- for Faculty, Staff and Students](http://clear.unt.edu/calendar) for further information.

**UNT HR Training and Development**

As noted on their [website](http://clear.unt.edu/calendar):
Alternate Forms of Training

Many of the General Access Labs around campus have tutorials installed on their computers. See http://computerlabs.unt.edu/ for a list of labs and their locations. The 24 Commons in Willis Library, for example, has a list of Tutorials and Software Support. The Library Instructional Unit also offers workshops and training, including "tech skills" training. Visit their websites for more information: http://www.library.unt.edu/library-instruction.

Info~Tech, UNT's IT Research Partner

Info~Tech is UNT's IT research partner. UNT System, UNT, UNT Health Science Center and UNT Dallas employees have access to Info~Tech research at: www.infotech.unt.edu (click on the UNT System name to login). Your standard EUID and Password gains you access to the Info~Tech system. Please take a moment to read their terms and conditions by clicking through the agreement when you set up your profile the first time you log in.

State of Texas Department of Information Resources

Another possible source of training for staff and, perhaps, faculty members is the Texas Department of Information Resources. A look at their Education and Training website reveals some interesting possibilities.

New Horizons Computer Learning Centers

New Horizons is a DIR vendor, which means that state agencies, like UNT, get special pricing for their services negotiated at the State level (click here for more information about DIR vendors). New Horizons offers courses at their own facilities in Dallas and Fort Worth, but will arrange for onsite training as well. They have a "Tips and Tricks" page that has helpful information. You can also join their mailing list to receive their monthly newsletter, event invitations and specials.

EDUCAUSE Live! Webinars

EDUCAUSE Live! is a series of free, hour-long interactive webinars on critical information technology topics in higher education. You can register for upcoming webinars and you can find recordings of all past webinars in the EDUCAUSE Live! archives.

Originally published January 2015 -- Please note that information in Benchmarks Online is likely to degrade over time, especially links to various Websites. To make sure you have the most current information on a specific topic, it may be best to go to the UNT Website and also consult the UNT Helpdesk. Questions and comments should be directed to benchmarks@unt.edu.
Staff Activities

Staff activities for UIT are reported in this column.

Transitions

New Employees:

- **Andrew Albright**, Classroom Support Services (part-time).
- **Davonta Hubbard**, Classroom Support Services (part-time).
- **Klarissa LeMoine**, Administrative Specialist, Data Management Services (ACUS).
- **Shashank Uniyal**, ACUS/Adaptive Lab consultant (part-time).
- **Currie Connor**, Classroom Support Services (part-time).

No longer working in UIT:

- **Marsh Parr**, Administrative Specialist, Data Management Services (ACUS) retired at the end of December. We wish her well.
- **Scott Yockel**, IT Manager, Research Computing Support (ACUS) left UNT for a similar position at Harvard University.
- **He Huang**, ACUS/Adaptive Lab consultant (part-time).

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Today's Cartoon

“He's in a Powerpoint-induced coma.”

From "Today's Cartoon by Randy Glasbergen", posted with special permission.
For many more cartoons, please visit www.glasbergen.com.

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