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IT Service Outage

By John Hooper, Acting Vice President for Information Technology and Chief Information Officer

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Computing Resources at UNT - Finding Your Way Around

By Claudia Lynch, *Benchmarks Online* Editor

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By the Numbers

Talon HPC

January marks the one-year anniversary of the operation of the Talon High-Performance Computing System (HPC). The following statistics represent Talon's workload for 2010 (no data was available for January, 2010 which was a partial month of operation.):

• Total CPU Time Logged (hours) - 7,877,991 (899 years)
• Most CPU Time in one Month - 1,035,242 (118 years, November)
• Most Number of Jobs in one Month - 9,577 (September)

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The issue behind the problems involved the Storage Area Network (SAN) that stores the data used by the virtual server farm and other servers. After working through several other scenarios, the solution was to reinstall an earlier hardware version of some SAN components that had recently been upgraded. These older components have been used successfully at UNT without failing.

Thanks to an extraordinary effort by many staff members of CITC and the SAN vendor, the restoration of the Storage Area Network (SAN) components was completed by 3:50 a.m. on Friday, January 14. We are confident this will address the issues we have been experiencing, while we work with the vendor to make a complete diagnosis of the problems. Most IT services that were impacted by this outage were immediately restored. Other services required restarting by network managers when they arrived Friday morning and were quickly made available.

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When all else fails ...

If you have a computing 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 Computing and Information Technology Center (CITC) Helpdesk is located in room 119 of the Information Sciences Building (ISB), directly beside the Science and Technology Library. 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 "Instructions for connecting to Exchange on the iPhone" Following is a selection of articles published in the recent past. Perhaps one of these topics is something you've been wondering about:

- *Connecting to UNT Email Services with the Motorola Cliq*

- *Viewing Shared Outlook Calendars Via the Web*

- *Checking UNT Exchange Mail using Entourage*

- *Checking your work Email via Exchange on Android*

- *EUID Passwords*

- *Using Mailhost as your Outgoing Mail Server (SMTP)*

- *Campus VPN*

- *EagleNet Workaround*

- *Outlook Hotmail Connector*

New students should be familiar with the **Tour of Student Computing Services at UNT**. There are lots of topics touched on that are of interest to non-students also. One of the handy stops on the Student Tour is a collection of Student Computing Documents -- PDF files that can be downloaded and/or printed for your convenience. Check out the website: http://www.unt.edu/helpdesk/studenttour/.

General Access Computer Lab System

The UNT General Access Computer Lab System is a collection of 14 computer labs spread across the UNT Denton campus, with one lab in Dallas. They have been set up to provide computing to the University community. The GACL 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 General Access Lab except where noted.

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

The University of North Texas Academic Computing Services General Access Lab is located in the Science and Technology Library in ISB 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 Computer-Based Training website has a list of training resources currently available to the UNT community.

Online Learning/UNTeCampus

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. The *Benchmarks Online* article, How Green is Our Learning?, about, in part, Blackboard Vista (our centrally-supported learning management system), may be of interest to faculty members. **iTunes U at UNT** is an offering that has lots of people excited. Read all about it here.

Other Items of Interest

- **Online Student Health Portal (OSH)** -- OSH is a web-based portal connecting students to the Student Health and Wellness Center (SHWC) 24 hours a day, 7 days a week. See the *Benchmarks Online* article "Just in time for the fall semester: an Online Student Health Portal" for further information.

- **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.

- **Gartner Research** -- UNT students, faculty, and staff have access to Gartner Research at: https://gartner.unt.edu/ CITC also sponsors direct access to Gartner researchers. For more information see Gartner Research Services.

- **Campus Subscription to Higher Education Newsletters**-- UNT has negotiated a group online subscription allowing campus members free access to the *Online Classroom* & *The Teaching Professor* higher education newsletters produced by Magna Publications. Click here for more information.

- **Research Services -** A number of research services are available from Academic Computing and User Services:

  - **High Performance Computing** – Graduate students working under the supervision of UNT researchers have access to the Talon HPC system and other high-performance computing resources. Website: http://citc.unt.edu/hpc (See below for more information on this service).

  - **Statistical and Research Support Services** -- Provides research and statistical consulting and more: http://www.unt.edu/rss. The RSS Group also publishes a monthly column in *Benchmarks Online*. You can view the recently-updated RSS brochure here: http://www.unt.edu/helpdesk/studenttour/pdf/rssbrochSpring2011.pdf

  - **Research and Visualization Environment (RAVE)** – High-powered workstations, a large-scale LCD monitor array, and specialized software are available in the RAVE at Discovery Park for visualizing research data. Website: http://citc.unt.edu/rave

- **Data Management Services** – Services are offered to graduate students completing masters theses or doctoral dissertations (with approval of your major professor): key-entry of survey or research projects into a custom data file, ready for analysis; customized scannable survey forms created using any current form. Website: http://www.unt.edu/ACS/datamanage.htm (See below for other data management services).

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

- **CITC Data Management Services** - Services include:

  - **Exam Grading/Analysis:** NCS ©Forms 4521 & NCS ©Form 106173, and (New!)) SCANTRON © Form 882-E. Exams can be processed within 15 minutes while you wait, or you can drop off and have results e-mailed for your convenience. Analyses' include Detailed Item Analysis, Frequency Distribution, and General Test Analysis.

  - **Research Projects:** Key-Entry of survey or research projects (grad student dissertation research allowed!) into a custom data file, ready for analysis.

  - **Scannable Form Design**: Customized scannable survey forms created using any current form, or just a new idea! Our service includes scanning the completed forms into a data file, ready for analysis, quick and easy!

  - **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.

    Location: ISB (Information Science Bldg.), north entrance, Room 140.

    For more information contact: Joann.Luksich@unt.edu 940.369.7416

- **High-Performance Computing System** - The High-Performance Computing System is available for use by UNT researchers whose research or scholarship requires use of computationally-intensive applications. See this *Benchmarks Online* article for further information. The HPC website states: "The Academic Computing and User Services division of the CITC supports multiple clusters of 64-bit processor systems running Linux for compute-intensive scientific research. Cluster computing provides dedicated systems for concurrent processing of jobs in a batch environment."

- **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]. **UNT Faculty, Staff, and Students are required to read the Security Handbook.** Links and further information can be found on the Information Security homepage.

  Information Security has recently created an announcement board on UNTRANET to post important security updates/alerts as an additional security resource. An article in this issue of *Benchmarks Online* provides further information on the announcement board.

- **Managing Spam** -- Actively manage e-mail that is sent to your campus e-mail address. See this *Benchmarks Online* article 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** -- Free download or $3 purchase.

- **Free Office Live Applications** -- Microsoft now includes Office Live applications in EagleConnect. Office Live applications are web-based (cloud) versions of **MS Word**, **Excel**, **Powerpoint**, and **OneNote** which provide the full functionality of their Office Suite installed counterparts. Further information can be found 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. Contact the UNT Bookstore at 940-565-3185 for additional information about the Microsoft products available to faculty and staff and/or visit www.unt.bkstr.com.

- **The Microsoft Home Use Program** -- Reduced price software for faculty/staff home use.

- **Student discounts in the UNT Bookstore** - As described on the StudentTour.

- **DreamSpark** -- UNT students can take advantage of DreamSpark, Microsoft's program that provides free development software to students. Click here for more information.

- **Free/Open Source software** -- Two articles on that topic from the RSS staff:

  1. Free ! = Cheap: Open Source and/or Free Alternatives in Statistical Analysis.

  2. Free your research: Open source and other alternatives to cut your costs and improve productivity as a graduate student.

- **Photoshop Express** - Free Online 'Photoshop' is a pretty good deal.

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

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Click on the banners below to find out more information and/or to register. The Call for Proposals for EDUCAUSE 2011 is open, and will remain so until early February.

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By Dr. Philip Baczewski, Director of Academic Computing and User Services

Net Neutrality - Overbearing Government Regulation or a Necessary Leveling of the Playing Field? Yes

On December 21, 2010, the U.S. Federal Communications Commission voted to adopt new rules to preserve the "open Internet", or as most people know it, "net neutrality." While representing a significant seismic event in the IT and Internet world (the geekdom, if you will), most people probably didn't feel this tremor and if these rules are successful, they shouldn't notice much change in how the Internet operates. The questions remains, is this some overbearing government regulation or a necessary leveling of the playing field? The answer is, "yes."

The idea of enforcing net neutrality has been around for a while and has been discussed in this column. Perhaps we've already forgotten we live in an era where it's common for our government to spy on its own citizens and act in the best interest of corporate rather than private citizens. But as discussed previously, the idea that we need net neutrality grew out of rulings by the Supreme Court and FCC, and is not a some would have you believe, a liberal conspiracy or government plot. Such views testify to an ignorance of technology, a blind eye to this country's commercial and industrial track record, or both.

Basically ...

At the root of the issue of net neutrality is what network people call "the last mile." That's the connection that you and I use to access resources and services on the Internet. The University of North Texas is able to tap directly into the Internet "pipe" and act as our own service provider. We pay for a maximum amount of bandwidth (an amount of data that can be transferred at any one time) and distribute services via our campus networks. At home, you and I must use an Internet Service Provider. We are typically paying for a promised amount of bandwidth, but that amount is shared with many other subscribers, and like the airlines, ISPs overbook.

Overbooking works, as long as we're all reading e-mail or browsing web pages which are generally low-bandwidth kinds of activities. But once we decided to watch a high-definition movie streamed from a service like NetFlix, we're using more than the typical bandwidth ISPs used to provision their infrastructure. If a whole bunch of us try to watch movies, then we may collectively saturate that bandwidth and all experience degraded performance seen as unwanted pauses in our movie screening. This will force the ISPs to upgrade their networks or face losing us as customers.

The ISP response can be to "throttle" the bandwidth available to NetFlix making that service less useful to us, they can increase the available bandwidth and charge us more to use it, or they can charge NetFlix to access their bandwidth as a way to pay for increased capacities. Or they can try to do all of that. This is not just a hypothetical argument, since there's a real case in the courts that may test the FCC's open Internet rules.

The bottom line is, should an ISP decide what you can access or how easily you can access it, or should all services and sources be treated equally? This is complicated by the fact that some companies that are ISPs, like Comcast, Charter, Verizon, and AT&T, are also content providers. They have movie packages they would like to sell you and deliver over the last mile. This would seem to be a conflict of interest between an open Internet and their own commercial concerns.

Follow the rules

The FCC's open internet rules are basically as follows:

1. Transparency. Fixed and mobile broadband providers must disclose the network management practices, performance characteristics, and terms and conditions of their broadband services;

2. No blocking. Fixed broadband providers may not block lawful content, applications, services, or non-harmful devices; mobile broadband providers may not block lawful websites, or block applications that compete with their voice or video telephony services; and

3. No unreasonable discrimination. Fixed broadband providers may not unreasonably discriminate in transmitting lawful network traffic.

These rules are contained in 194 pages of text to explain and justify the rules.

The FCC rules do allow service providers to exercise "reasonable network management practices." The ruling states,"A network management practice is reasonable if it is appropriate and tailored to achieving a legitimate network management purpose, taking into account the particular network architecture and technology of the broadband Internet access service." For Mobile providers the FCC determined, "existing mobile networks present operational constraints that fixed broadband networks do not typically encounter. This puts greater pressure on the concept of 'reasonable network management' for mobile providers, and creates additional challenges in applying a broader set of rules to mobile at this time." In other words, mobile providers may be able exercise unreasonable discrimination if it still seems to be "reasonable network management."

All of this seems like a lot of rationalization to support a flawed model of service provision. I've got two companies who want to run fiber-optic cable to my house in order to provide telecommunications, ISP, and media content services. The problem is, if I choose one of them, then I am limited to the media content they provide at at their mercy to allow the Internet content I seek (who cares about fixed-line telecommunications any more?) I'd like a fiber-optic line to my house and be able to select and change my content provider to suit my budget and requirements. I believe we call that "competition."

Lest we forget

The Supreme Court ruled against competition in the case of cable company and ISPs and the FCC followed suit with DSL broadband services. It seems to me that we are forgetting the lessons of the past. At one time, a monopoly controlled who would provide your long distance phone service, and long distance service was very expensive compared to what it is today. A company called MCI protested this arrangement and the telephone network was forever changed (I can't help but think that this also allowed the Internet to develop as quickly as it did.) Today, long distance telephone service is a commodity that sells for a market price.

The FCC's open Internet rules go into effect within 60 days of being published in the Federal Register, so we can expect them by the end of February or beginning of March if Congress doesn't somehow intervene with legislation in this regard. I doubt there will be any immediate effect anyway, since while you can complain to the FCC if you think your ISP is violating the rules, these kinds of issues are usually settled in court, a process that could take years. It's possible that technology and social trends could be well past this issue by the time it is resolved in the courts. In the mean time, we can demand neutrality from our service providers and could even "vote with our feet" if they hadn't locked us into long-term contracts.

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Documents for Student Computing

A collection of Student Computing Documents are available from the Student Tour website. The documents are PDF files that can be downloaded and/or printed for your convenience. Available documents are:

- *Is Your Computer Secure?* – *a checklist and resource for password security, virus protection, copyright advice and a variety of other security issues.*

- *The University of North Texas General Access Computer Labs* – *contains a map of all lab locations and all lab hours. (See information below also.)*

- *Computing Resources for Students* – *a listing of all the student computing services available and how to access them quickly online.*

- *Computing Services for Graduate Students* – *a listing services and resources particularly pertinent to graduate students.*

    - *Research and Statistical Support Services* – *a listing of services and resources available from the Research and Support Services (RSS) staff.*

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Helpdesk FYI

By Jonathan "Mac" Edwards, CITC Helpdesk Manager

Instructions for connecting to Exchange on the iPhone

After much waiting the iPhone 4 is finally coming to Verizon, and while many ha[ve]
perfectly content with Android, I imagine quite a few of you have been anxiously
this announcement for quite some time.   In preparation of Verizon's 02/10/2011
release date it seemed like a good time to revisit this tutorial, first published last June.

On the iPhone home screen, go to **Settings** -> Mail, Contacts, Calendars -> Select the email account to modify, or select **Add Account…**

If starting from a new account, first select your account type. Select **Microsoft Exchange**.

In the **Email field**, type in your email address, ex. first.last@unt.edu. <u>Do not</u> use an email alias as your email address, for example smith@unt.edu.

For the **Server field**, type in "autodiscover.unt.edu". It is no longer necessary to manually type in your Exchange server. Note: At first the application may not ask for the Exchange server. You will input it later in this case.

In the **Domain field**, type in "UNT" in all caps.

For the **Username** be sure to use your EUID, and not an alias or alternate username that may work on other UNT websites.

In the **Password** field type in your UNT password. When your password expires, your phone will later ask you to retype your password in a pop-up window, so further changing the settings every 120 days will not be necessary.

In the **Description** field you may name the email account in any manner you would like. For example: "Work Email", "Exchange Account". The default will be the email address you type in earlier.

Select **Next** -> The application will verify your account details with the Exchange server. If any details are incorrect the application will respond at the top of the window with a message saying "**Account Verification Failed**". If this happens double check your credentials and try again.

If the application stays on the current screen and adds a **Server field**, type in "autodiscover.unt.edu" or "webmail.unt.edu", then select next.

Once your account details have been verified, it will ask you to select which features you would like to use.

Selecting **Mail** will sync your email account to the mail application. Selecting **Calendars** will add your Exchange calendar to your phone. Selecting **Contacts** will sync you Exchange contact with your phone.

**Note: If you select Calendar or Contacts, it will erase any current contacts or calendar entries you currently have in your phone. Also, it will only sync your personal calendar, and not others. Selecting your contacts will not only add your contacts, but all of the people on the Exchange server. In the case of UNT, this is a very large number of faculty and staff.

After selecting which features you would like to use, you can select **Done** and go back to your home screen.

The new account will be listed in next to any others you may have. Upon selecting the account and viewing the default folders, your phone will contact the Exchange server and begin pulling emails and folders. This may take several minutes to complete on a slow data connection. If on 3G or wifi, this is often done in under one minute.

For an alternative instructions, or additional tutorials you may consult the Enterprise Messaging and Directory Services Group (EMDS) website at http://emds.unt.edu/node/353.

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IRC News

Minutes provided by Christine Valenzuela Recording Secretary*

The IRC -- unofficially now known as the INFORMATION TECHNOLOGY COUNCIL (ITC) -- is currently undergoing a reorganization, see the May 20, 2008 minutes for more information.**>

No IRC/ITC minutes were available for publication this month.

*For a list of IRC Regular and Ex-officio Members click here (last updated 12/12/08). Warren Burggren is now the Chair.

**DCSMT Minutes can be found here.

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Research and Statistical Support
University of North Texas

Bayesian Generalized Linear Models in R

Link to the last RSS article here: Linear Mixed Effects Modeling using R -- Ed.

By Dr. Jon Starkweather, Research and Statistical Support Consultant

Bayesian statistical analysis has benefited from the explosion of cheap and powerful desktop computing over the last two decades or so. Bayesian techniques can now be applied to complex modeling problems where they could not have been applied previously. It seems likely that the Bayesian perspective will continue to challenge, and perhaps sub-plant, traditional frequentist statistical methods which have dominated many disciplines of science for so long. The current article will review one function which allows the user to conduct linear regression, general linear modeling, and generalized linear modeling (i.e. non-Gaussian; e.g., Poisson, binomial, etc.). A fairly simple model is specified, then modeled using traditional techniques, and then modeled with a Bayesian approach. Do not implement these methods unless you understand the core principles of the Bayesian perspective (i.e. priors, likelihoods, posteriors, etc., and all they entail).

A complete treatment of the Bayesian perspective is beyond the scope of this article and could fill several books; and has. Interested readers can consult a number of introductory texts focusing on the Bayesian perspective (e.g., Berry, 1996; Bolstad, 2004; Gelman, Carlin, Stern, & Rubin, 2004; Hoff, 2009). Very generally speaking, the Bayesian approach to statistical inference differs from traditional frequentist inference by assuming that the data are fixed and model parameters are random, which sets up problems in the form of; what is the probability of a hypothesis (or parameter), given the data at hand? These types of problems can be stated with symbols as: $p(H|D)$. Traditional frequentist inference assumes that the model parameters are fixed (though unknown) and the data are essentially random; for instance, if the null hypothesis is true, what is the probability of this data? These types of problems can be stated in the general form; what is the probability of the data given a hypothesis? In symbols, this translates to: $p(D|H)$.

Bayesian methods focus on five essential elements. First, the incorporation of *prior* information (e.g., expert opinion, a thorough literature review of the same or similar variables, and/or prior data). Prior information is generally specified quantitatively in the form of a distribution (e.g., normal/Gaussian, Poisson, binomial, etc.) and represents a probability distribution for a coefficient; meaning, the distribution of probable values for a coefficient we are attempting to model (e.g., β weight). It may help to think of the prior as an educated *best guess*. Second, the prior is combined with a *likelihood function*. The likelihood function represents the data (i.e. what is the distribution of the estimate produced by the data). Third, the combination of the prior with the likelihood function results in the creation of a *posterior* distribution of coefficient values. Fourth, *simulates* are drawn from the posterior distribution to create an empirical distribution of likely values for the population parameter. Fifth, basic statistics are used to summarize the empirical distribution of simulates from the posterior. The mode (or median or mean) of this empirical distribution represents the maximum likelihood estimate of the true coefficient's population value (i.e. population parameter) and credible intervals can capture the true population value with probability attached.

Keep in mind; priors should be rationally and honestly derived. They can be *weak* or *strong*. These terms refer to the strength of belief we have in the prior(s). Weak priors result when we do not have a great deal of evidence or prior information on which to base the prior(s). When the prior is weak, the prior distribution will be wide, reflecting a

great many possible values and the likelihood will be more influential in creating the posterior distribution. Strong priors, conversely, result when we have a great deal of evidence on which to base the prior(s). When the prior is strong, the prior distribution will be narrow, reflecting a smaller range of possible values and the likelihood will be less influential in creating the posterior (strong priors will influence the posterior more than the likelihood). It should be clear the one key feature of the prior is the ability to quantify our uncertainty. The posterior can be thought of as a compromise between the prior and the likelihood. If the prior is weak, then it will be less influential in creating the posterior; if the prior is strong, then it will be more influential in creating the posterior.

The example used here is a simple linear regression model with one interval/ratio outcome (extro) and three interval/ratio predictors (open, agree, social). The *simulated* data set contains 500 cases, each with complete data (i.e. no missing values).

Import the data from the web, get a summary of the data, and take a look at the correlations. We see very little multicollinearity here.

```
R R Console
File Edit Misc Packages Windows Help

R is a collaborative project with many contributors.
Type 'contributors()' for more information and
'citation()' on how to cite R or R packages in publications.

Type 'demo()' for some demos, 'help()' for on-line help, or
'help.start()' for an HTML browser interface to help.
Type 'q()' to quit R.

> data1 <- read.table("http://www.unt.edu/rss/class/Jon/R_SC/Module10/BayesGLM_example.txt",
+     header=TRUE, sep=",", na.strings="NA", dec=".", strip.white=TRUE)
> summary(data1)
      extro           open            agree            social
 Min.   :108.1   Min.   :26.91   Min.   : 47.81   Min.   :13.01
 1st Qu.:144.7   1st Qu.:45.77   1st Qu.: 90.70   1st Qu.:22.58
 Median :155.2   Median :50.32   Median : 99.20   Median :24.93
 Mean   :155.7   Mean   :50.41   Mean   :100.13   Mean   :25.08
 3rd Qu.:167.2   3rd Qu.:55.10   3rd Qu.:110.01   3rd Qu.:27.45
 Max.   :205.3   Max.   :69.44   Max.   :149.29   Max.   :38.84
> cor(data1)
            extro         open        agree        social
extro  1.0000000   0.53601980   0.84510471   0.08392999
open   0.5360198   1.00000000   0.01570736  -0.01462117
agree  0.8451047   0.01570736   1.00000000  -0.00175529
social 0.0839300  -0.01462117  -0.00175529   1.00000000
>
```

Confirm / take a look at the core Linear Model (lm) -- traditional Ordinary Least Squares (OLS) regression.

```
> model.1 <- lm(extro ~ open + agree + social, data = data1)
> summary(model.1)

Call:
lm(formula = extro ~ open + agree + social, data = data1)

Residuals:
     Min        1Q    Median        3Q       Max
-2.30609  -0.68503  -0.01365   0.73440   3.04784

Coefficients:
             Estimate Std. Error  t value Pr(>|t|)
(Intercept) -4.944214   0.530766   -9.315   <2e-16 ***
open         1.199690   0.006343  189.136   <2e-16 ***
agree        0.900636   0.002982  302.022   <2e-16 ***
social       0.397546   0.011839   33.580   <2e-16 ***
---
Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

Residual standard error: 1.016 on 496 degrees of freedom
Multiple R-squared: 0.9962,      Adjusted R-squared: 0.9962
F-statistic: 4.324e+04 on 3 and 496 DF,  p-value: < 2.2e-16

>
```

Notice in the output, the intercept is approximately -5.0. The unstandardized coefficients for each predictor are listed. The open coefficient is approximately 1.2, the agree coefficient is .90, the social coefficient is approximately 0.40. We could calculate a 95% confidence interval (CI_{95}) for each predictor's coefficient; for instance, the CI_{95} for open is 1.187 to 1.212. But what does this *really* tell us? Well, it is interpreted as: if an infinite number of samples were taken from this population, 95% of the open coefficient values would be between 1.187 and 1.212. But it does not tell us the range which contains the true population value.

The same results are below; but, the results below were generated with the Generalized Linear Model (glm) function,

specifying the default Gaussian (normal) family distribution. The primary benefit of the `glm' function is the ability to specify error distributions other than normal.

```
> model.2 <- glm(extro ~ open + agree + social, data = data1, family = gaussian)
> summary(model.2)

Call:
glm(formula = extro ~ open + agree + social, family = gaussian,
    data = data1)

Deviance Residuals:
     Min        1Q    Median        3Q       Max
-2.30609  -0.68503  -0.01365   0.73440   3.04784

Coefficients:
             Estimate Std. Error t value Pr(>|t|)
(Intercept) -4.944214   0.530766  -9.315   <2e-16 ***
open         1.199690   0.006343 189.136   <2e-16 ***
agree        0.900636   0.002982 302.022   <2e-16 ***
social       0.397546   0.011839  33.580   <2e-16 ***
---
Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

(Dispersion parameter for gaussian family taken to be 1.032558)

    Null deviance: 134466.65  on 499  degrees of freedom
Residual deviance:    512.15  on 496  degrees of freedom
AIC: 1440.9

Number of Fisher Scoring iterations: 2

> |
```

To conduct the Bayesian GLM, load the package `arm' which contains the `bayesglm` function (Gelman, et al., 2010). You will notice there are several dependencies.

```
> library(arm)
Loading required package: MASS
Loading required package: Matrix
Loading required package: lattice

Attaching package: 'Matrix'

The following object(s) are masked from 'package:base':

    det

Loading required package: lme4

Attaching package: 'lme4'

The following object(s) are masked from 'package:stats':

    AIC

Loading required package: R2WinBUGS
Loading required package: coda

Attaching package: 'coda'

The following object(s) are masked from 'package:lme4':

    HPDinterval

Loading required package: abind
Loading required package: car
Loading required package: nnet
Loading required package: survival
Loading required package: splines

arm (Version 1.3-08, built: 2010-11-20)
Working directory is c:/Documents and Settings/jds0282/Desktop/Work_Stuff/Jon_R
Loading required package: foreign

Attaching package: 'arm'

The following object(s) are masked from 'package:coda':

    traceplot

> |
```

Conduct the Bayesian Generalized linear model (here family = Gaussian) and get the summary of the output. Notice the specification of the prior mean, scale, and degrees of freedom. Each `family' of distributions requires specific prior specifications (e.g. a binomial distribution would have slightly different prior specification; see the package documentation for details or simply type `help(bayesglm)' in the **R** console).

```
> model.3 <- bayesglm (extro ~ open + agree + social, family = gaussian, data = data1,
+                       prior.mean=0, prior.scale=Inf, prior.df=Inf)
> summary(model.3)

Call:
bayesglm(formula = extro ~ open + agree + social, family = gaussian,
    data = data1, prior.mean = 0, prior.scale = Inf, prior.df = Inf)

Deviance Residuals:
     Min        1Q    Median        3Q       Max
-2.30609  -0.68503  -0.01365   0.73440   3.04784

Coefficients:
             Estimate Std. Error t value Pr(>|t|)
(Intercept) -4.944214   0.528638  -9.353   <2e-16 ***
open         1.199690   0.006318 189.897   <2e-16 ***
agree        0.900636   0.002970 303.238   <2e-16 ***
social       0.397546   0.011791  33.715   <2e-16 ***
---
Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

(Dispersion parameter for gaussian family taken to be 1.024298)

    Null deviance: 134466.65  on 499  degrees of freedom
Residual deviance:    512.15  on 500  degrees of freedom
AIC: 1440.9

Number of Fisher Scoring iterations: 5

> |
```

We can see the output matches up with the traditional linear model (OLS regression) as well as the traditional GLM. As sample sizes increase the results should converge to the same values.

One of the benefits of the Bayesian perspective (for any analysis) is that it allows us to make *credible interval* statements. Credible intervals are similar to confidence intervals, but in the Bayesian framework, the interval REALLY IS believed to contain the true population parameter. For instance: a 95% credible interval for a parameter being estimated is interpreted as; there is a 95% probability that the actual parameter is included in that interval. This is because the interval is based on information from the posterior distribution; of for instance, one of the predictor's coefficient posterior distribution (e.g. the open variable's coefficient posterior distribution).

The `bayesglm' function represents a kind of short cut of the Bayesian approach to inference. Typically, the posterior is not used directly for making inferences. Instead, an empirical distribution is constructed based on draws from the posterior and that empirical distribution is what informs the inference(s). Here, we are using the `bayesglm' as a proxy for doing the added empirical distribution. With the `bayesglm' we get a distribution of `simulates' which are used in place of an actual empirical distribution (which will be covered further below).

Retrieve the posterior distributions of the coefficients for the intercept and all three predictors. The `head' function simply lists the first 10 rows of the object on which it is run (the default `head' is the first 6).

```
> simulates <- coef(sim(model.3))
> head(simulates, 10)
       (Intercept)      open      agree     social
  [1,]   -5.256479 1.204338 0.8973143 0.4136634
  [2,]   -5.188813 1.198698 0.9020349 0.4057331
  [3,]   -4.609328 1.198168 0.8988569 0.3961592
  [4,]   -4.279686 1.183936 0.9005968 0.4027266
  [5,]   -5.439462 1.203092 0.8992952 0.4155758
  [6,]   -4.962830 1.202151 0.8987105 0.4024284
  [7,]   -5.190100 1.202345 0.9019534 0.3953540
  [8,]   -4.397217 1.191770 0.9018699 0.3882703
  [9,]   -4.432026 1.189979 0.8994867 0.4012326
 [10,]   -4.213517 1.198061 0.8965457 0.3869824
> |
```

Extract just the posterior distribution of the 'open' variable's coefficient. Again, the `head' function simply lists the first 10 items of the object.

```
> posterior.open <- simulates[,2]
> head(posterior.open, 10)
 [1] 1.204338 1.198698 1.198168 1.183936 1.203092 1.202151 1.202345 1.191770
 [9] 1.189979 1.198061
> |
```
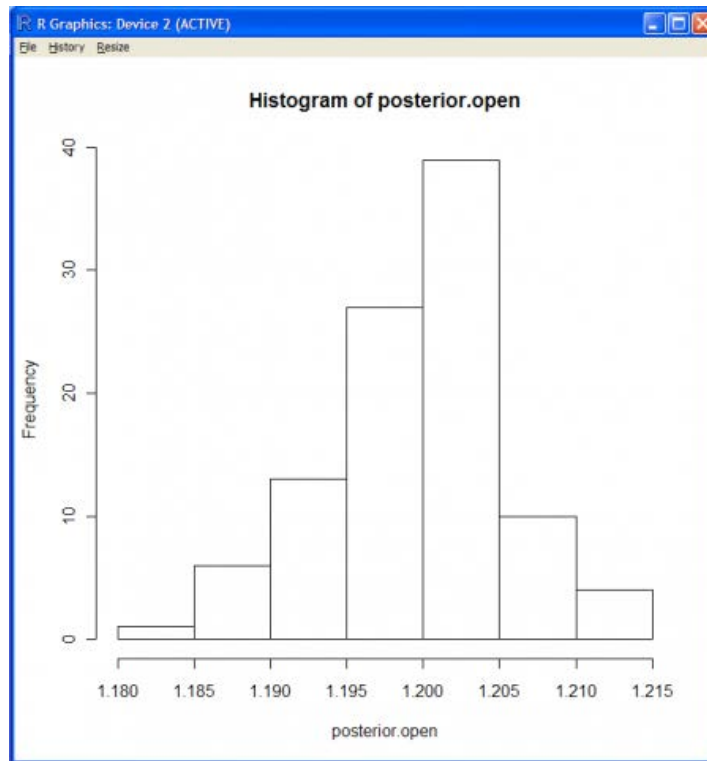
Take a look at the posterior distribution of the open variable's coefficient (normally a histogram would not be used, it is used here simply as a graphical reference).

```
> hist(posterior.open)
> |
```

The `density' plot is normally used to display a posterior. The density plot can be thought of as a highly modified histogram. Imagine a histogram with 100 bins (instead of the 7 as displayed in the histogram above), then imagine plotting a line from the x-axis through each bin's midpoint at the top of each bin, and then back down to the x-axis; the result would be the density plot.

```
> plot(density(posterior.open), main = "", xlab = "Posterior.open", ylab = "Density")
>
```
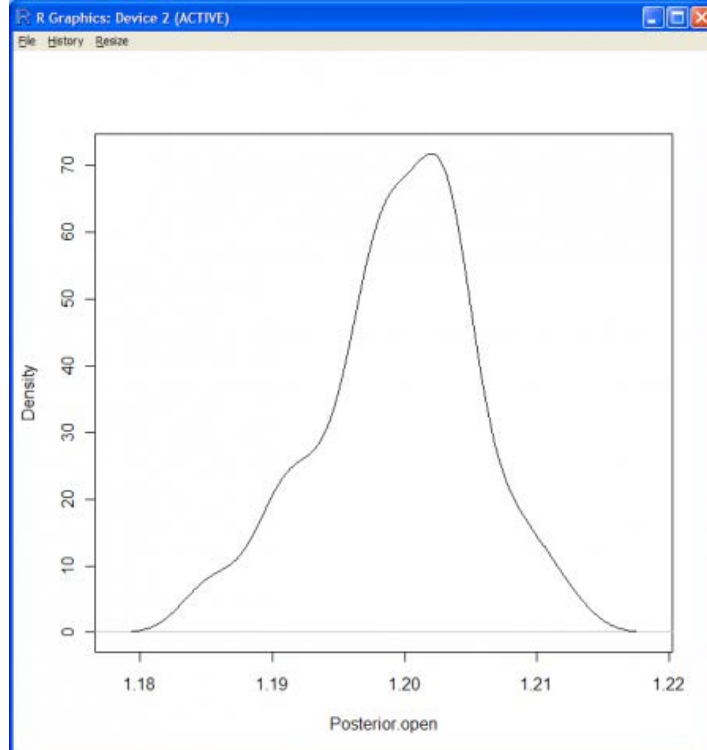

Now we can retrieve the 95% credible interval for the open variable's coefficient.

```
> quantile(posterior.open, c(.025, .975))
     2.5%     97.5%
1.186170 1.210246
>
```

Recall, this credible interval is interpreted as; there is a 95% probability that the true population value of the open coefficient is between 1.186 and 2.210. Keep in mind, these numbers will fluctuate slightly based on the iterative nature of the function.

To make truly Bayesian inferences about our coefficients, we need to do the extra step of creating the empirical distribution(s) mentioned above. Going further entails actually creating an empirical distribution based on iterative draws from the posterior. The `MCMCregress' function in the package `MCMCpack' (Martin, Quinn, \& Park, 2010) provides us with the Markov Chain Monte Carlo simulation method of creating the empirical distribution; which itself allows us to then compute the descriptive statistics used for inference. Meaning, the mode, median, or mean of the empirical MCMC simulates' distribution is the 'maximum likelihood' estimate (i.e. top of a density function) of the population parameter. The `MCMCregress' function also gives us the credible interval which includes the actual population parameter value. MCMCpack also contains functions for many other types of models and contains other ancillary functions for working with MCMC objects.

First, load the `MCMCpack' library.

```
> library(MCMCpack)
##
## Markov Chain Monte Carlo Package (MCMCpack)
## Copyright (C) 2003-2010 Andrew D. Martin, Kevin M. Quinn, and Jong Hee Park
##
## Support provided by the U.S. National Science Foundation
## (Grants SES-0350646 and SES-0350613)
##
> |
```

Next, apply the `MCMCregress' function. Notice, the model formula is the same, but here we have some new options. The 'burnin' argument is used because MCMC iterates are sensitive to their initial start values, so the first few (i.e. 3000) iterations are discarded. The 'mcmc' simply issues how many (post-burnin) iterations will be used to build the empirical distribution. The 'thin' defaults to 1 and represents a control on convergence, such that once approximate convergence has been reached it can be beneficial to keep only a few simulates and discard the rest to conserve computer resources (Gelman, Carlin, Stern, & Rubin, 2004). The verbose option (by default is off) simply does or does not print the iteration history as the function runs. The seed argument simply allows the user to set the random number generator seed. The 'beta.start' argument allows the user to set a start value for the beta vector.

```
> model.4 <- MCMCregress(extro ~ open + agree + social, data = data1, burnin = 3000, mcmc = 10000,
+                        thin = 1, verbose = 0, seed = NA, beta.start = NA)
> summary(model.4)

Iterations = 3001:13000
Thinning interval = 1
Number of chains = 1
Sample size per chain = 10000

1. Empirical mean and standard deviation for each variable,
   plus standard error of the mean:

               Mean       SD  Naive SE Time-series SE
(Intercept) -4.9460 0.529359 5.294e-03      5.485e-03
open         1.1996 0.006430 6.430e-05      5.125e-05
agree        0.9007 0.002983 2.983e-05      2.870e-05
social       0.3976 0.011705 1.170e-04      1.188e-04
sigma2       1.0367 0.066217 6.622e-04      6.404e-04

2. Quantiles for each variable:

               2.5%     25%     50%     75%   97.5%
(Intercept) -5.9681 -5.3023 -4.9422 -4.5963 -3.8876
open         1.1869  1.1953  1.1997  1.2039  1.2120
agree        0.8947  0.8987  0.9007  0.9027  0.9064
social       0.3743  0.3896  0.3977  0.4054  0.4205
sigma2       0.9149  0.9910  1.0338  1.0795  1.1752

> |
```

Notice in the summary, we get the coefficient estimates ("1. Empirical…") and credible intervals ("2. Quantiles…"). So, we can say there is a 95% probability that the true population value of the open coefficient is between 1.1869 and 2.2120.

An Adobe.pdf copy of this article can be found [here](#).

References & Resources

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Until next time, ``Stop; hey, what's that sound...''

BOOKMARK

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light to
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Short Courses

Instructor-led courses are still on hold. 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. **SPSS and SAS courses; they are now offered _online_ only.** RSS staff will be still be available for consultation on those topics, however. Another class available online is **_Introduction to R_**.

Surf over to the Short Courses page to see instructions for accessing the SPSS and SAS online learning and other training that is available to you. You can also see the sorts of instructor led courses that have been offered in the past.

Special classes can always be arranged with the RSS staff. See "Customized Short Courses" below for further information. 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 ACS Short Courses, which are available to students, faculty and staff, staff and faculty members can take courses offered through the Human Resources Department (they have a new comprehensive training curriculum), and the Center for Learning Enhancement, Assessment, and Redesign. Additionally, the Center for Achievement and Lifelong Learning offers a variety of courses, usually for a small fee.

EIS training is available. Questions or comments relating to EIS training should be sent to EISTCA@unt.edu.

Microsoft E-Learning

Microsoft E-Learning courses are now available for **_faculty and staff_** via our UNT-Microsoft Campus Agreement and some new Microsoft Office 2010 courses were recently added. Please contact Claudia Lynch at lynch@unt.edu for instructions on accessing this training.

Microsoft Outlook Tutorials and much more

The Enterprise Messaging and Directory Services Group has all sorts of useful information on their website, including tutorials and FAQs. The home page displays a list of their newest tutorials with tutorial topic pages displaying the most accessed pages. You can search the site for whatever you're interested via a Search Box on the left-hand side of the page.

Central Web Support

Consult Central Web Support for assistance in acquiring "Internet services and support." As described on their website:

CWS provides Internet services and support to UNT faculty, staff and students. Services include allocating and assisting departments, campus organizations and faculty with web space and associated applications. Additionally, CWS assists web developers with databases and associated web applications, troubleshooting problems, support and service.

CLEAR (was Center for Distributed Learning)

CLEAR offers courses especially for Faculty Members. A list of topics and further information can be found here.

The center also offers a "Brown Bag" series which meets for lunch one **Wednesday** a month (recently changed from the first Thursday of each month) at Noon in Chilton 245. The purpose of this group is to bring faculty members together to share their experiences with distributed learning. One demonstration will be made at each meeting by a faculty member with experience in distributed learning. More information on these activities can be found at the CLEAR Website. Scheduled meeting dates for the rest of the school year are:

- January 26
- February 23
- March 23
- April 20

UNT Mini-Courses

There are a variety of courses offered, for a fee, to UNT faculty, staff and students as well as the general public. For additional information surf over to http://www.unt.edu/minicourses/

Information Security Awareness

The UNT Information Security team has been offering Information Security Awareness courses to all UNT faculty and staff. Topics to be covered will include workstation security, sensitive data handling, copyright infringement issues, identity theft, email security, and more.

For more information, or if you would like to request a customized course to be taught for your department, contact Gabe Marshall at x4062, or at security@unt.edu.

Also, Information Security Training is now available through Blackboard Vista (formerly known as WebCT).

Alternate Forms of Training

Many of the General Access Labs around campus have tutorials installed on their computers. See http://www.gal.unt.edu/ for a list of labs and their locations. The 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

The Training Website has all sorts of information about alternate forms of training. Computer Based Training (CBT) and Web-based training are some of the alternatives offered, although due to the rising costs of training, shrinking budgets and changing technology, computer-based training at UNT is in a state of transition. For up-to-date information on CBT at UNT, see the CBT website.

Gartner Research Services

Way back in 2006 we announced *Gartner Core Research Services Now Available to the UNT Community*. Our subscription for Gartner services has always included **all** UNT faculty, students, and staff. All you need to do to access the subscription is to log into the UNT Gartner portal page at https://gartner.unt.edu/. Gartner is now offering "Webinar Wednesdays." To view all the offerings see: http://my.gartner.com/portal/server.pt?tbb=webinarcalendar You can also listen to Gartner podcasts here: http://www.gartner.com/it/products/podcasting/asset_137461_2616.jsp.

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.

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Transitions

New Employees:

- **Trayton Oakes**, Helpdesk Microcomputer Consultant (part-time). Trayton has returned to the Helpesk after serving as an intern in Washington DC as part of the NTDC program!

- **Travis Fraser**, Student Assistant Data Communications (part-time).

No longer working in the Computing and Information Technology Center:

- **Brittany Padilla**, CITC Helpdesk Consultant (part-time).

- **Chad Stevenson**, CSS Tech, Classroom Support Services (part-time).

- **Santosh Pentapati**, Technical Writer, Enterprise Messaging and Directory Services Group.

- **Bradford Hawbaker**, Information Security Intern (part-time).

Changes, Awards, Recognition, Publications, etc.

Marriage brings a change in names

Donna Holley, Administrative Services Officer, got married last October and is in the process of getting folks used to her new last name - **Jackson**. She will leave her e-mail signature Donna (Holley) Jackson for awhile so that people will realize who the message is coming from. Congratulations on your recent marriage **Donna Jackson**!

Service to UNT

Patricia Bell, Administrative Specialist, Asset Management & Travel, was recently recognized by *InHouse* for her **15 years** of service to UNT. Recognized for their **5 years** of service to UNT was **Georgia Baldwin**, Administrative Specialist, Telecom Services; **Hasina Aziz**, Programmer Analyst, Student Records Data Systems (AIS); and **Nnaemeka Onuoha**, Programmer Analyst, Financial Information Systems (AIS). Congratulations one and all!

Soaring Eagles

Barbara Heffley was recognized as a Soaring Eagle in the January/February 2011 issue of *HR Connections*, the Human Resources Newsletter.

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Today's Cartoon

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"I already owe $15,000 in student loans.
And that's just for my high school prom!"

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