25 Years DACS

DACS.doc

A Computer & Technology Newsletter

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Next Event: January 2 — Artificial Intelligence

Directors' Notes

Danbury Area Computer Society Board Meeting Minutes Wednesday, December 6, 2017

The meeting was called to order at 7:08 pm by the DACS President, David Green.

ln attendance were Board members Richard Corzo, Dick Gingras, Andy Woodruff, and David Green (President). Also present was Charles Bovaird, who took the minutes.

The Minutes of the 11/8/2017 (November) Board Meeting were accepted.

The November Treasurer's report was received from Bert.

Dues receipts came to $280, enough to give us a very small gain for the month but less than November a year ago. The total Year to date (11 months) dues receipts are now below last year by $260.00.

Expenses continue to be normal and the 11 month year to date totals continue similar to 2016, adjusted for John Patrick's book expenses (that he covered). Our General Fund balance of $2,935 is now below last year's November balance by $141.

The reserve that we need for pre-paid dues now stands at $1,309, well below the $2935 on hand (does NOT count the Resource Center Fund).

The Resource Center Fund continues to have a balance of $655.

The Membership report was received by e-mail from Jim Scheef:

83 paid-up members (including 2 new), and 11 in-grace, for a total of 94.

14 people attended the 12/6/2017 general meeting, including 3 visitors.

Websites:

Richard reported no significant problems on the DACS website.

IN THIS ISSUE

Old Business

Programs:

At the January 2018 meeting, Andrew Ribeiro, a member of the Danbury Al Meetup group, will speak about Artificial Intelligence.

Preview - *Richard Corzo*

Review - *Andy Woodruff*

Dick has been in contact with the Apple Store about a presentation. Their policy has always been to insist that events be held in the store but there appears to be a possibility that the policy will change.

Renovation of the Resource Center

Dick reported that a donation of used carpet may be available from the Matrix Center. He is in conversation with Bruce Tuomala about this.

New Business

Election of two new board members took place at this December General meeting.

Bert Goff and Dave Green were elected and accepted as board members.

A search for a DACS president continues. A President is a requirement for a viable corporation.

We are requesting DACS members to email the names of any potential candidate to *dacsprez@dacs.org* or *dacsboard@dacs.org*.

Snacks for General Meetings:

Richard Corzo will provide snacks for the January meeting. and David Green will bring the drinks

Bert will contact Jim about asking non-renewing members (by e-mail) for feedback concerning why they are leaving DACS.

A discussion took place on how we can get more visitors to the DACS general meeting.

The meeting was adjourned at 9:03 pm.

—Charles Bovaird

Membership Information

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An International Association of Technology & Computer User Groups

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Apple User Group

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HelpLine

Our former telephone HelpLine has been replaced by our web-based DACS Community Forum at *http://forum.dacs.org*. We have topic-specific forums where DACS members can post questions. Questions may be answered by Workshop leaders or other DACS members. If none of the categories fit your question, just post it to the Ask DACS forum.

Topic	Forum
Linux	Linux Workshop
Desktop publishing and website design	Web Site Design Workshop
Mac and iPhone/iPad/iPod touch	Apple Workshop
Online/small business	Online Business
Single board computers	Single Board Computers
Smartphones & Tablets	Mobile Devices Workshop
Social media	Social Media
Video capture/processing	Video
Windows	Windows Workshop

There are Many Ways to Join DACS

An easy way to join DACS is to attend one of the monthly general meetings. General meetings are normally held on the first Tuesday of each month at Danbury Hospital. Or join right on our Website via the PayPal link, where you may also pay by credit card without a PayPal account.

General meetings are always free to the public, but only members benefit fully from DACS' many other events, activities, and publications. As a member you become part of a dynamic computer group in the Greater Danbury Area.

You will receive a subscription to *dacs.doc*, our award-winning monthly newsletter, packed with news and information pertinent to computer users of all levels. In addition to interesting feature stories, the newsletter contains a monthly calendar of events and a recap of the the previous general meeting and last month's workshops. Members may also post questions to the DACS Community Forum.

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January Meeting Preview

Artificial Intelligence and the Dawn of Deep Learning

By Richard Corzo

Date: January 2, 2017, 7:30 pm
Danbury Hospital Auditorium
Presenter: Andrew Ribeiro

WE'RE FINDING MORE and more examples of Artificial Intelligence (AI) in the world around us. We have intelligent assistants like Alexa, Siri, and OK Google. There are now self-driving cars. We have programs that beat champions in chess and the Chinese board game Go. Expert systems like *Watson* can beat Jeopardy champions, or assist doctors in diagnosing patients. Our guide to this subject will be Andrew Ribeiro, who leads an AI Meetup group at the Danbury Hackerspace, and is co-founder of Knowledge-Exploration Systems.

Andrew will concentrate on the new area of deep learning, itself a subset of machine learning (ML), which "gives computers the ability to learn without being explicitly programmed." Deep learning requires access to massive amounts of data that enables it to recognize patterns. His talk will paint a picture of the historical trends in Artificial Intelligence that led to the emergence of deep learning and will discuss the state of the art models which are transforming the field.

Prior to deep learning, people used a huge variety of methods to solve particular AI problems. With the popularization of deep learning, people have been using deep neural networks for everything with record breaking success. Analogous to neural networks in the brain, artificial neural networks consist "of a number of simple, highly interconnected processing elements." From beating Go champions to self-driving cars, people in the field use neural networks in some capacity now.

Andrew's talk will be similar to a presentation given at Google by Pedro Domingos, author of *The Master Algorithm: How the Quest for the Ultimate Learning Machine Will Remake Our World*.

If you are interested in getting into the field, Andrew can point you to the mathematics that you will need to learn, and online courses that will give you a good background.

Andrew Ribeiro is a computer scientist working in the field of Artificial Intelligence as the co-founder of Knowledge-Exploration Systems--a Danbury based AI and systems development contractor. He studied traditional computer science at WCSU and extended his knowledge to include AI by taking online courses, reading the classic books, and reading research papers in the field while applying the ideas to commercial R&D applications. Due to the intensive intellectual demands of mastering such a diverse field, he also co-founded Danbury AI in 2016 to foster a local community of AI experts and enthusiasts that help each other grow and learn.

Uncle DACS Wants YOU!

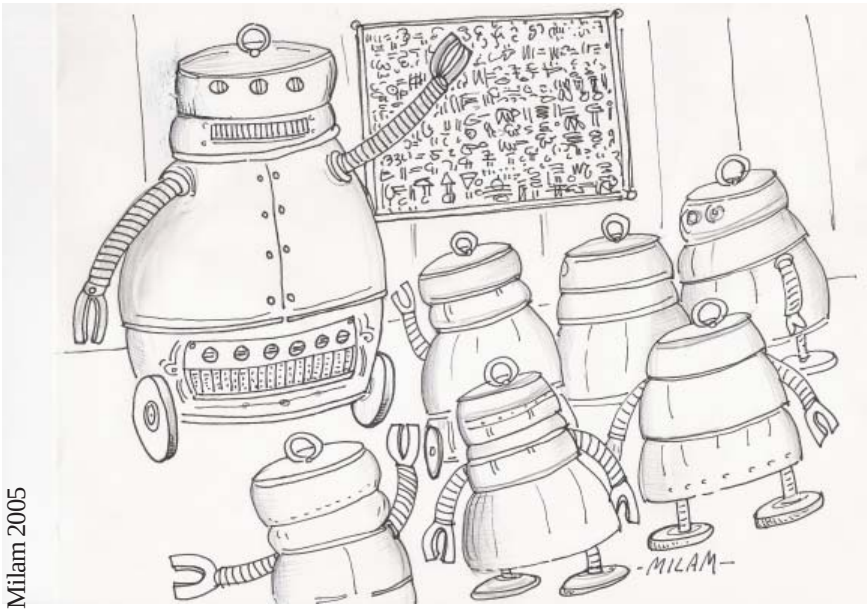
We rely on volunteers for all our activities. Current positions include:

Vice President: Help the president and eventually become new president.

Social Media: Help DACS post interesting technical content

Painters: Help with the renovation of our resource center.

Workshop Leaders: Organize a group, or join an existing one.



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"No, Robbie--the idea that robots were really created by humans is considered only a theory."

December Meeting Review

Minecraft

By Richard Corzo

DECEMBER'S MEETING was a departure for DACS. I think it was our first presentation about a computer game. Andrew Kwashnak and his son Thomas introduced us to the world of Minecraft. Drew informed us that Minecraft, which first came out in 2011, was the second most popular computer game in history, after Tetris.

There are three main versions of Minecraft: the Java desktop edition that runs on Windows, Mac, and Linux; the Bedrock edition for mobile devices such as Android, iOS, and Windows Mobile; and the console versions for Xbox, PlayStation, and Nintendo. Minecraft was created by Swedish game designer Markus Persson who founded the company Mojang, which was later bought by Microsoft. This year Microsoft a Better Together Edition that allows players on different platforms to use the same server to play each other.

You need to create a Minecraft account in order to play. The world of Minecraft includes many biomes, climate zones such as desert or forest, holding natural resources that you "mine" and can use to build or "craft" things that help you survive in the Minecraft world. Everything you see has a very blocky look, including the sun and moon. It's possible to play alone or with others over a network. In the latter case you can use a public server, or run your own server at home.

Successively more durable materials you may find are wood, stone, iron, and diamond. Gold is also available and has magical properties. You can mine blocks of these materials if you have the proper level tools. Tools you can make are an ax, pickaxe, shovel, hoe, and sword. Creatures such as cows, chickens, and sheep can provide useful materials, such as leather, feathers, and wool, respectively.

As you play the game, you'll see status bars showing hunger, health, and armor levels. As your food level drops, you'll have less energy to expend on tasks. Nighttime is perilous as that is when hostile mobs can go after you. You need to make a bed before nightfall to protect you from the mobs. In addition to the survival mode, there is also a creative mode where you just concentrate on building things.

After the break Thomas showed us what "programming" is like in Minecraft. It's a visual task that to me looked a lot like playing the game without the landscape background. Thomas showed how he could program different "doors" which look a lot different in the Minecraft world than any door I've seen in real life. It's possible to build working models that are similar to designing circuits.

A teacher in the audience asked what the educational value of Minecraft might be, since it seems to be popular in schools. Drew gave an example where someone created a biome that taught children what it might be like to survive on Mars. Another teacher created a world where the Aztecs might have lived.

Minecraft is a very open world that seems to capture the imagination of young people. Perhaps it's a virtual version of the wooden blocks and Tinkertoys that I played with as a child.

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Workshops

Workshop Notes: January 2018

Apple. Focuses on all aspects of the Mac and iPhone operating systems.
Contact: Richard Corzo (*applesig@dacs.org*).
Meets 2nd Tuesday, 7 p.m. at DACS Resource Center.
Next Meeting: Cancelled

Jobs. Networking and jobs search

Contact: Charles Bovaird, 203-792-7881 (*aam@mags.net*). Go to DACS Community Forum (*http://forum.dacs.org) for job listings*.

Linux. Helps in installing and maintaining the Linux operating system. Also of interest to Apple owners using OS X.
Contact: Dave Mawdsley, *linuxsig@dacs.org*

Meets 3rd Wednesday, 7:30 p.m. at the DACS Resource Center.
Next Meeting: Jan. 17

PC Maintenance. Review of PC hardware and OpSys maintenance and use.
Contact: Charles Bovaird, 203-792-7881 (*aam@mags.net*). Go to DACS Community Forum (*http://forum.dacs.org*).

Online Business Workshop. Informal member gathering sharing ideas on creating an online source of income.
Contact: Steve Harkness (*onlinebizsig@dacs.org*)
Meets second Monday in Brookfield, or by Webinar.
Next Meeting: Check *dacs.org*.

Single Board Computers Workshop. Explores small cheap computers like Raspberry Pi, Arduino, Netduino, Beaglebone, and more. Meets at 7:00 p.m on the 3rd Thursday at the DACS Resource Center.
Contact: Jim Scheef (860-355-0034)
Next Meeting: Jan 18

Video Workshop. Explores all aspects of video capture and production, including both inexpensive and professional choices for cameras and editing software.

Meets on the 3rd Thursday of certain months, typically at 7:00 pm at the Resource Center. Check the Calendar for details.
Contact: Andy Woodruff (awoodruff@dacs.org)
Next meeting: Check dacs.org

Web Development/Design Web Development/Design This workshop is looking for a new moderator. Being a workshop leader is a great way to share information, learn new techniques, promote your business, and interact with like-minded people. Extensive web knowledge is not required, but a willingness to open a topic for discussion and enjoy the contributions and feedback from the attendees. Meets every 3rd Tuesday of the month, but repeating date can be changed if needed.

Contact *avanommeren@dacs.org,* or *webmaster@dacs.org* .
Next meeting: TBA–Look for updates

Let's Meet Up

Have you ever wondered who the other members of DACS are, what their interests are, and whether they have experience and knowledge that could benefit you? Would you like to be able to identify and contact the other members, sharing information with them, but without having to disclose your e-mail and phone details?

Your Board has recognized that one of the benefits of DACS membership should be the means to communicate with each other in this way.

At the July general meeting, we began with a quick series of introductions, giving attendees an opportunity to communicate their interests.

The Board has discussed at length how to promote communication between members, and has looked at the pros and cons of a number of ways to do this. The general meeting introductions were our first effort in this regard; another one we would like to offer is a resource already in use by DACS: Meetup.

DACS has been a user of Meetup for several years, to distribute and share information about general meetings and workshops. For this service, we pay fees. Now we would like to leverage the full potential of Meetup, by encouraging its use for individual DACS members as a channel of communication.

If you are not already a user of Meetup, please go to *www.meetup.com* and sign up to become one. There is no charge for individual users. After you have joined Meetup, you can join the Danbury Tech Meetup (emphasizing DACS' broader technology focus), and see a list of upcoming meetings.

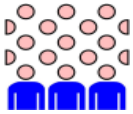
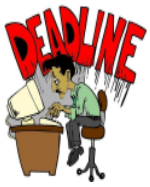
Meetup gives you an opportunity to create a profile of your interests. If you wish, you can upload a photo of yourself. You will also find that there is a Message function, which allows you to send private messages to other Meetup users, without using e-mail. We hope that the resources of Meetup will prove to be a valuable addition to DACS membership.

Question: What is Meetup?

Answer: according to Wikipedia, "Meetup is an online social networking portal that facilitates offline group meetings in various localities around the world. Meetup allows members to find and join groups unified by a common interest, such as politics, books, games, movies, health, pets, careers or hobbies."

January 2018

Danbury Area Computer Society

Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
	1 	2  **General Meeting** 7:30 PM	3  **Board of Directors** 7:00 PM	4 **Danbury Hackerspace Open House** 7:00 PM	5	6
7	8	9 **AI Developer Meetup Hackerspace** 7-9 PM **Apple** 7:00 PM Richard Corzo *applesig@dacs.org* Cancelled	10	11 **Danbury Hackerspace Open House** 7:00 PM **Membership Committee** 7:00 PM Jim Scheef 860-355-0034	12	13
14	15	16	17 **Web & App Developer Meetup Hackerspace** 7-9 PM  **Linux** 7:30 PM Dave Mawdsley *linuxsig@dacs.org*	18 **Danbury Hackerspace Open House** 7:00 PM  **Single Board Computers Workshop** 7:00 PM Jim Scheef 860-355-0034	19	20 
21	22	23 **Danbury Inventors' Meetup Hackerspace**	24	25 **Danbury Hackerspace Open House** 7:00 PM	26	27
28	29	30	31			

Dec 2017

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Feb 2018

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Technology Tools

GNU Octave

By Dick Maybach

ENGINEERS, SCIENTISTS, and eduators use computer math tools extensively—and students would also find these helpful—but their costs are often a barrier. Fortunately, free programs such as GNU Octave (*http://www.gnu.org/software/octave/*) and Scilab (http://www.scilab.org/) provide similar power to their commercial kin and both are available for Windows, OS X, and Linux. They are modeled after the popular commercial program Matlab (https://www.mathworks.com/), which sells for $50 for the student version and up to $2150 for the standard one. If you are a parent, you may be concerned that if your student uses such a tool, he or she may use it to avoid learning math, but in my experience, this doesn't happen. While teaching engineering, I found that many in my class had not mastered basic math, and I introduced computer tools to provide them with alternative approaches. However, the only students who made use of these were those already skilled in math. Apparently, people who had the initiative and talent to master computer math had already used these same assets to learn what was being taught in the math classroom, and they used the computer tools to gain additional advantages over their slower friends. Life isn't fair.

I'll discuss GNU Octave in this article, mostly because it is closer to the widely-used Matlab than is Scilab; indeed, many Matlab programs will run without change on Octave. Becoming proficient with any math tool takes considerable time, and if possible you should choose one that gives you skills you can transfer later. Octave is basically a programmable scientific calculator; that is, you enter a math relation and it computes a numerical result. Figure 1 shows the program in operation.

Its window has four panes

- upper-left - file browser,
- center-left - workspace, showing the active variables,
- lower-left - command history, and
- right - commands and results.

The command pane is where you work and is essentially a view into a command-line terminal. You can do only primitive editing here, usually with the arrow keys, backspace, and delete, but you can also copy and paste. The ">>" character pair is the command prompt. Note the tabs below the command pane, which give you access to a real editor and extensive help.

Let's look at the simple examples shown in Figure 1.

- You do simple arithmetic just by entering an expression followed by a tap of the Enter key. Here, we see that 2 + 3 = 5.
- There are built-in constants such as ? ("pi" in Octave-speak), which you can use in your expressions, and we see that 2? = 6.2832. Note that multiplication must be declared explicitly using the "*" character.
- Higher-level functions are available, such as sinc(x), which is defined as sin(? x)/(? x), except that sinc(0) is defined as 1.0. (This exception is needed because 0/0 isn't defined.) Figure 1 shows this verified.
- When using Octave, you will often be working with vectors, arrays, and matrices, and there are shortcuts to help in defining these. The example shows one, where x = (0 : 0.2 : 1) defines x as an array with values starting at 0, increasing by 0.2, and ending at 1.
- We can use this array as an argument for sinc, to find sinc(x) for x = 0, 0.2, 0.4, 0.6, 0.8, and 1.0.
- Finally, we can redefine x to be an array with values from -4 to +4 and separated by 0.1 and plot the sinc function. (The arguments "linewidth" and

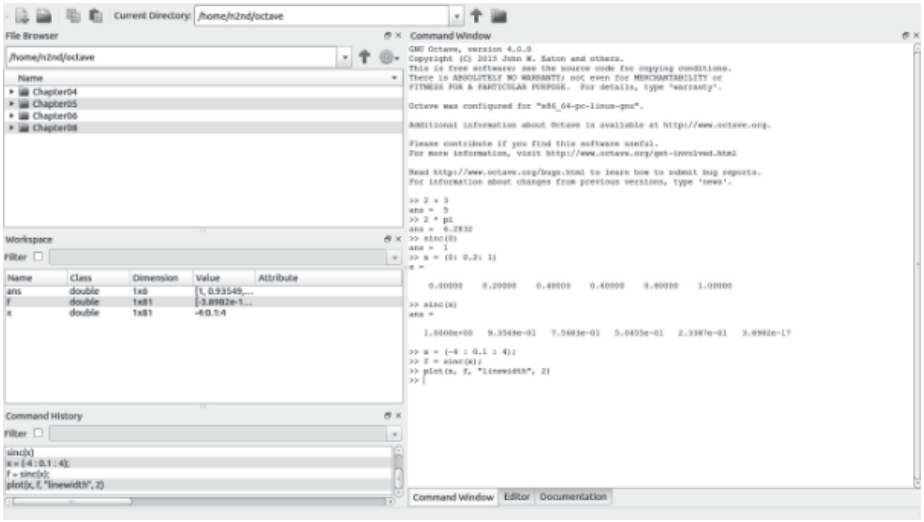

Figure 1. Gnu Octave Window.

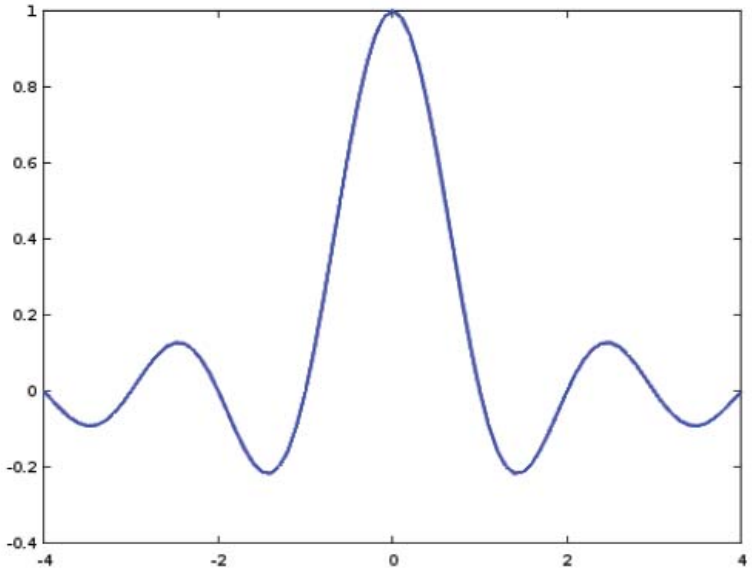

Figure 2. Plot of the sinc function.

2 make the trace thicker than its default, which I felt was too thin.) The result appears in Figure 2.

You can often gain more insight from a simple plot than from an expression or a table of values.

Let's show a more complex example using the sinc function, as shown in Figure 3.

Figure 3 shows the following steps. (If your math is rusty, the details may be gibberish, but that's unimportant. The point here is that defining a plotting complex functions is easy and provides insight that is difficult to achieve by just looking at the expressions.)

- Define an array x with values from -2 to +2 in steps of 0.1. (The semicolon at the end of the line prevents printing the 41 values.
- Define a second array y with the same values as x.
- Define a two-dimensional array [X Y] with each element being a pair of numbers from x and y. Its top row is (-2, 2), (-1.9, 2), … (2, 2); its second row is (-2, 1.9), (-1.9, 1.9), … (2, 1.9); and so on.
- Evaluate sinc for every element of [X Y]. Note that the expression X.^2 causes the elements of the array to be squared individually. If instead we had used X^2 (without the "."), we would have multiplied the entire array of X values by the same array. With the operation shown, f is a 41 by 41 array whose elements are the sum of the squares of the elements of [X Y]. This is shown in the Workspace pane.
- Finally, we make a surface plot of the result, shown in Figure 4. (The button at the upper-left corner of the screen enables rotating the plot by dragging its corners.)

Octave can also solve simultaneous linear equations (beloved by algebra teachers and feared by their students). Figure 5 shows an example.

$$2x_1 + x_2 - 3x_3 = 1$$
$$4x_1 - 2x_2 - 2x_3 = 3$$
$$-x_1 + 0.5x_2 - 0.5x_3 = 1.5$$

Figure 5. Simultaneous Equations

We can restate this, using matrix notation, as Ax = b, where the matrices are defined as shown in Figure 6. Compare Figures 5 and 6 and you'll see that A contains the coefficients of the equations. Its top row holds those of the top algebraic equation and so on. Matrix b is similarly defined by the constants on the right.

Again, using matrix notation, the solution is x = A-1b, where the -1 exponent indicates that the matrix A is inverted. (Using Octave commands, this becomes be x =

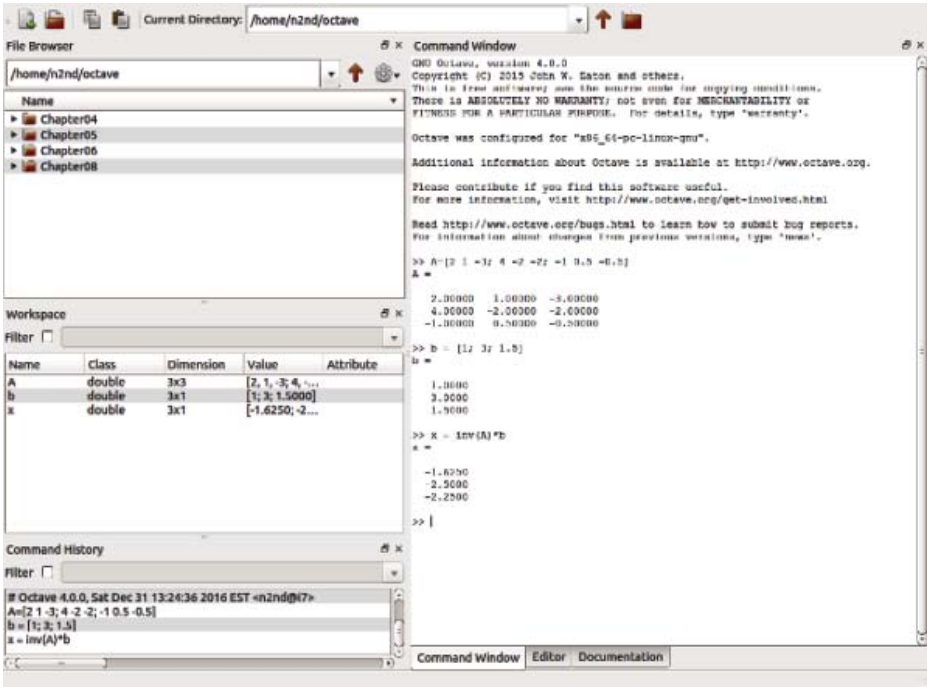

Figure 3. Three-Dimensional Plotting Commands

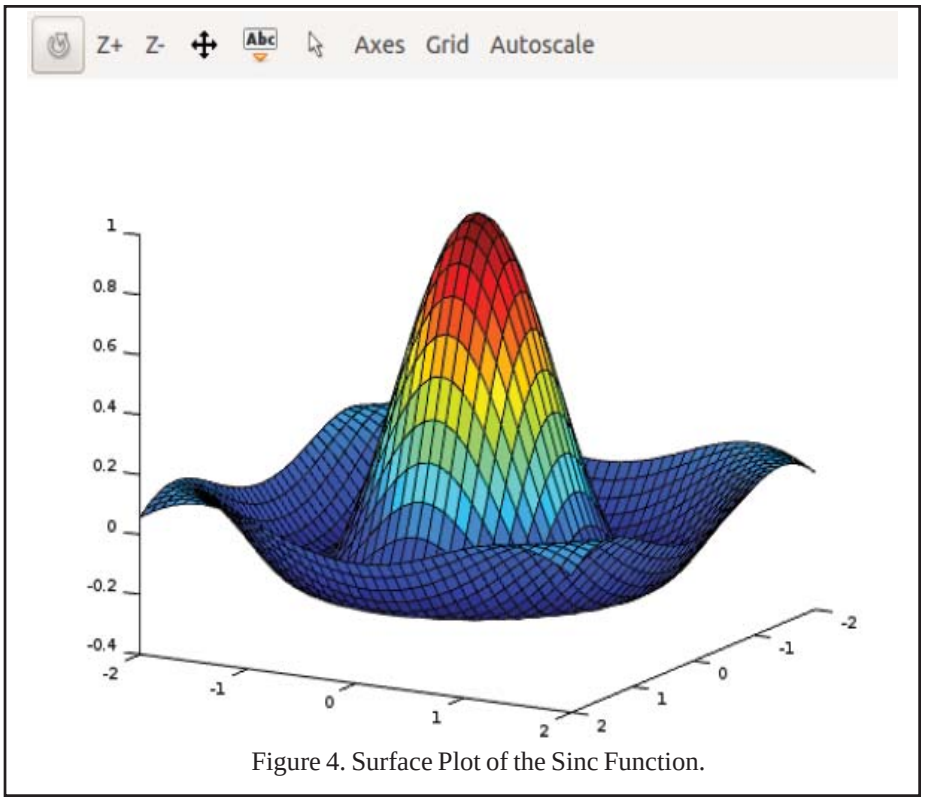

Figure 4. Surface Plot of the Sinc Function.

$$A = \begin{bmatrix} 2 & 1 & -3 \\ 4 & -2 & -2 \\ -1 & 0.5 & -0.5 \end{bmatrix} \quad b = \begin{bmatrix} 1 \\ 3 \\ 1.5 \end{bmatrix} \quad x = \begin{bmatrix} x_1 \\ x_2 \\ x_3 \end{bmatrix}$$

Figure 6. Simultaneous Equation Matrix Definitions.

inv(A)*b.) Finding the inverse of a matrix, even only a 3 by 3 one, using paper and pencil is time-consuming and error-prone. As a result, those of us who were educated BC (before computers) relied on algebra instead. All this changed when personal computers and mathematics programs became available. Figure 7 shows this problem solved using Octave.

As you can see, it required entering only three lines, one to define A, one to define b, and one to request the solution, which is x1 = -1.6250, x2 = -2.5, x3 = -2.25.

This has been a brief introduction to Octave with the goal of letting you know what it is and the sorts of things it can do, and I've covered only a very few of its capabilities. In particular, I haven't discussed Octave programs, which you can write to solve complex problems. Although it can't compensate for a lack of math skills, it can be invaluable for those that have them. There are many applications packages that add additional capabilities. These are listed on the Octave Website, and some are discussed in the references below.

A good starting tutorial for learning more is the 280-page GNU Octave Beginner's Guide (*http://jordi.platinum.linux.pl/octave/Jesper%20Schmidt%20Hansen%20-%20GNU%20Octave%20for%20Beginners.pdf*), which you will also see available in print. The user interface has evolved since this was written, but the commands are unchanged and its examples work. Also, see the 300-page and more up-to-date Octave at BFH-TI Biel (*http://web.ti.bfh.ch/~sha1/Labs/PWF/Documentation/OctaveAtBFH.pdf*). It shows the current user interface, but has a more academic approach than the Beginner's Guide. Unfortunately, both documents don't always use standard ASCII characters. For example "*" is not always the asterisk that Octave uses for multiplication. As a result, pasting the examples into the program often produces errors, but you will quickly find what to look for. The official manual is the 1000-page GNU Octave (*https://www.gnu.org/software/octave/*). This too is up-to-date, but its heavy reading and is a command reference rather than a tutorial. Finally, an Internet search will turn up several getting-started guides.

A math program like Octave won't compensate for deficient math skills, but it will add insight and speed up finding solutions for those who already have them.

Dick Maybach *is a member of Brookdale Computer Users' Group, NJ (*www.bcug.com; n2nd (at) att.net*).*

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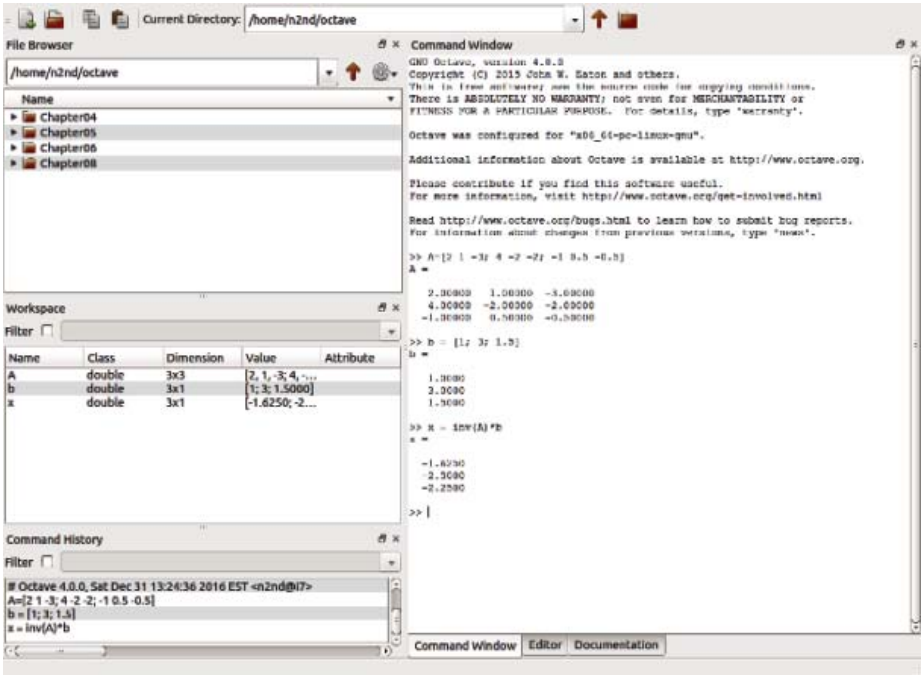

Figure 7. Simultaneous Equation Solution Using Octave.

Operating Systems

Chromebooks for Seniors

by Rich Davis

CHROMEBOOKS ARE laptops that use Google's operating system. They are quite inexpensive as compared to a Windows or Apple machine. My newest Chromebook is 15" and was $129.00 as a refurbished item.

I had a back injury some years ago when I heard about Chromebooks as they had just been rolled out. The critics slammed them as being quite useless. I seemed to be drawn to them after reading a lot about how they work. This looked like a good computer to me. I decided to challenge the critics and make this my main machine if I could. I would be able to spend some time learning as I was laid up.

One drawback that the critics named was storage. My first Chromebook had only 18gb of hard drive. I had a Gmail account and found that I had 15gb of space for free. I could also add an SD card to give me much more. Also, when you buy a Chromebook you get an extra 100gb of online storage for free for a couple of years. Another, or maybe equal to the first was that you had to be online to use your Chromebook. I always am so that didn't bother me. Improvements have made the Chromebook useful offline as of now.

The third obstacle was that you couldn't load software.

True, but instead we use apps that are downloaded. In my opinion, they are better than software. Some of the apps are not as robust as a complete software suite. But, hey, I have slowed down with work and the apps work fine for me. Also, Google sets up a drive in the cloud, which means on their servers, for the user. Included is a software suite almost as good at Microsoft Office and compatible with it.

Once I got the knack of using my Chromebook I never looked back. Updates take a few seconds. The laptop starts in 7 seconds. The battery life is about 10 hours. I can watch Netflix movies, Skype, Email, create documents and slideshows, and much more. There is no need for antivirus software.

It is perfect for me. Did you know that 70 percent of schools use Chromebooks because of their price and functionality eclipsing iPads and Windows machines for students? So, the critics were dead wrong. They didn't give something new a fair chance. A couple of years ago my grandson, 14, told me how cool my Chromebook was. I sure was proud of my decision to go with my gut and try something new.

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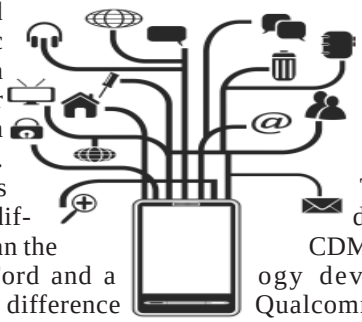
Hand Tools

Is your cell phone CDMA or GSM? - Should you care?

By Phil Sorrentino

THE SHORT ANSWER to the second question is "probably no," but there are some benefits from knowing the differences that may help you decide which cell phone provider or cell phone to choose. The answer to the first question depends on your cell phone provider. CDMA and GSM are the two basic technologies used in modern digital cellular networks, which are then used by mobile phones. These two technologies are very different. The difference is much more than the difference between a Ford and a Chevy. It's more like the difference between a gas-powered car and an electric vehicle; they both do the same thing, they get you to your destination, but the internal workings are very different. You can't use a CDMA phone on a GSM network (and vice versa), just like you couldn't use the gas engine from the gas-powered vehicle to run an electric vehicle. So, if you are on a CDMA network, you need a phone with CDMA radio-telephone circuitry, and if you are on a GSM network, you need GSM circuitry in your phone. So, which phones have what, may be a question you will have to answer when signing up for your next cell phone plan.



Although there are many places to buy a cell phone, in the United States there are only four major cell phone networks. (US Cellular is actually a fifth, but much smaller network.) The four are Verizon, AT&T, Sprint, and T-Mobile, and they are evenly divided by the technologies used. Verizon and Sprint use CDMA and AT&T and T-Mobile use GSM. (US Cellular uses CDMA.) CDMA stands for Code Division Multiple Access and GSM is short for Global System for Mobile (Communications), both of which are terms used to represent the collection of many radio-telephone technologies that comprise the two different systems. CDMA actually describes the technology that is used to keep separate all the data channels that use the same wireless frequency band. Whereas GSM is the name of a standard used to describe the protocols used in digital cellular networks. But then, what is in a name? A rose, by any other name, would still be a rose. By the way, most of the world outside the US uses GSM, so if you need to use your phone over-seas, it will probably have to be compatible with GSM. This is another example of how an open standard can dominate over a proprietary product (think Android over iOS). GSM is an open standard, developed by the European Telecommunications Standards Institute, whereas CDMA is a proprietary technology developed and owned by Qualcomm. (Just to be complete, GSM uses a Time Division technique for keeping channels separate.)

Another difference you may be already be aware of, is the SIM card, or Subscriber Identity Module. GSM uses a removable SIM card as a container for customer information. CDMA does not typically use a SIM card. The SIM card is an integrated circuit chip that is intended to securely store the International Mobile Subscriber Identity (IMSI) number and its related cryptographic key, both of which are used to identify and authenticate subscriber devices. It's much easier to change phones on GSM networks, because of the removable SIM card. Just take the card out, put it into another phone, and the new phone now has your number. CDMA networks use a different technique to identify and authenticate subscriber devices. CDMA uses a network based database. The phone information has to be put into a "white list" database, that is then used to control access to the network. If you have a CDMA phone with a SIM card, it may be there to support foreign GSM networks and the phone may be called a "world phone" (which may be good to have if you travel a lot). You may also find a SIM card in a newer CDMA phone. It may be there to support the newer faster 4G LTE networks, because SIM cards are part of this new standard. Where did 4G LTE come from? you might ask. Well, so far, we haven't said anything about network speed and that is what 4G LTE refers to.

Most current networks operate at a 3G speed, which translates to a data rate of around 1-2Mbps. 3G has been in use since about 2003. The G only indicates Generation. The 4th Generation or 4G provides an almost 10 times increase in speed, so 4G will move data at around 10Mbps. The LTE indicates "Long-Term Evolution", which is a standard for high-speed wireless communications for mobile phones and devices. LTE is the up

All of the four major networks have 4G, so if money is not an issue, a 4G phone would be advisable. Also, if you spend a lot of time on the web or regularly stream video, 4G might just be worth the extra phone cost. So, in general, if you expect to transfer large amounts of data, 4G is definitely worth it, but keep in mind that it is very easy to go over your data plan limit when you are working at the higher speed. Finally, if you want to future-proof your phone, get a 4G phone. 4G is only going to get better because that is where network operators are spending their money. Also realize that a 4G phone is backward compatible and will operate on 3G and even 2G networks. You still might consider only a 3G phone if you don't have a need for the faster data rate of 4G, and/or you use it mostly for voice. Also, if you live in an area that doesn't have 4G yet, the 3G phone might be just fine. So, in the long run, you should probably care about the network type so you can make an informed decision the next time you have to buy a phone or phone plan.

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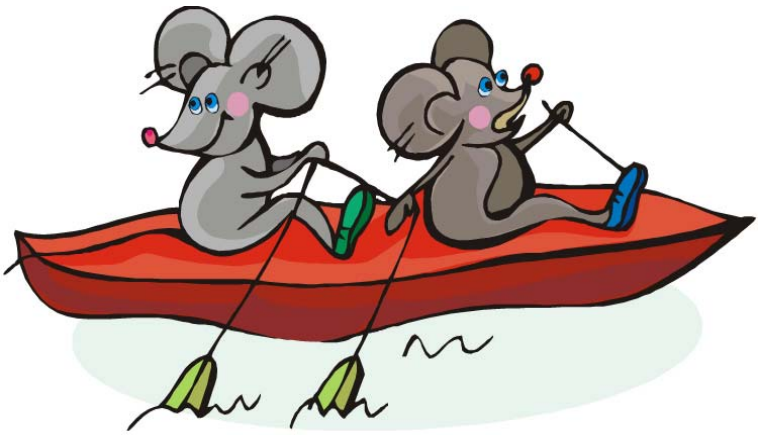

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