

# Cazoodle's Vertical Search technology enables a One-Stop Apartment Search Engine

Renters no more need to visit so many websites to find their dream apartments. At Cazoodle, they can find up-to twenty-five times more apartment listings than existing services.

Cazoodle, an emerging startup from University of Illinois (the home-ground of Mark Andreessen, Mosaic and Netscape), is using technology developed at the university research to provide the largest ever apartment search engine. Apartment renters can find measurably more apartment listings at Cazoodle Apartment Search website (http://apartments.cazoodle.com), currently serving 20 metropolitan markets. For instances, for San Francisco Bay-area, a metropolitan area with over seven hundred thousand residents, Cazoodle lists over 30,000 apartments for rent. In contrast, the most popular apartment services today, like Rent.com, Apartments.com or Move.com, offer less than a thousand listings for the entire San Francisco Bay-area.

Besides offering far greater number of listings, the website also provides useful search interface, using deep integration of variety of related information. For each apartment, it provides detailed description, monthly rent, floor plan information, and a link back to the original Web site from where Cazoodle's AgentBot obtained that listing. With the integration of map, renters can evaluate how well the locality matches their preferences—they can take virtual tours using street-view, find near-by grocery stores, schools, restaurants, and more, and determine how far the apartment is located from their work-place.

Founded in 2006 by Prof. Kevin Chang and his research team at University of Illinois, Cazoodle's mission is to enable deep "data-aware" vertical search in every domain where user needs are not served well. The key novelty of Cazoodle's technology, based on university research on large scale information integration over the "deep Web"—the *structured* data on the Web, is to quickly adapt to new vertical markets---Starting from apartments for rent, as the company offers currently, it plans to provide similar services for online comparison shopping, and finding community events.

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# **Key Personnels**

### **Kevin Chang**

Founder and President, Cazoodle Inc.

Associate Professor, Computer Science, University of Illinois at

Urbana-Champaign

Kevin C. Chang is a leader in Web search and integration technologies, and his research pioneered large-scale information access over the "deep Web"-- structured data on the Web. He is an Associate Professor in Computer Science, University of Illinois. He received PhD in Electrical Engineering in 2001 from Stanford University. He received NSF CAREER Award in 2002, NCSA Faculty Award in 2003, and IBM Faculty Awards in 2004 and 2005.

### **Govind Kabra**

Chief Technology Officer, Cazoodle, Inc.

Govind received a Master of Science in Computer Science from the University of Illinois at Urbana-Champaign. Govind's thesis work focuses on "Large Scale Information Integration on the Web: Finding, Understanding and Querying Web Databases", in the context of the MetaQuerier Project, which spun off into Cazoodle. He has published several papers in premier conferences such as SIGMOD and ICDE in the areas of information integration, Web search, and databases.

### <u>**Iason Hertenstein**</u>

Public Relations Director, Cazoodle, Inc.

Jason attended Carthage College at Kenosha, WI. Initially Jason's emphasis was on Theology. A job at the Goshen News Newspaper in Goshen, IN changed his intended career path, completely falling love with Marketing and all of its various strategies. Jason has worked at several styles of media outlets, such as Newspapers, Radio, TV, and even tapped into the world of Pre Pay telecommunications.

Cazoodle.com Apartment Search will publicly launch this national service during the Web 2.0 Expo 2009 being held in San Francisco March 31 - April 3. The service will provide nationwide coverage of the entire United States, including major metropolitan areas such as Boston, Chicago, Dallas, Detroit, Houston, Los Angeles, New York City, Philadelphia, Phoenix, San Francisco Bay Area, and Seattle.

Cazoodle's intelligent crawling software automatically gathers apartment listings from thousands of landlord websites and other online sources, and goes beyond simply providing large numbers of rental apartment search results. Consumers can also take virtual tours of apartment surroundings using Cazoodle's integration with Google street view images. Search results include links to the original websites to facilitate contact with landlords. Landlords and real estate property owners do not pay any fees to get listed on Cazoodle.com. By contrast, other apartment search services often charge fees for rental properties to be listed.

### About Cazoodle.com:

Cazoodle.com is a vertical search company that uses proprietary "deep Web" semantic search technology developed by University of Illinois computer science professor Dr. Kevin Chang. The company's Cazoodle.com Apartment Search is the first one-stop apartment search website to combine deep integration of map visualization with apartment rental information. Cazoodle is actively developing other products, including a consumer Shopping Search service for online electronics shopping. "We have the technology and we want to use it," says Dr. Chang. The company is located in Champaign, Illinois.

### ###

### Cazoodle.com

Jason Hertenstein

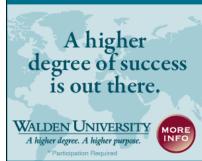
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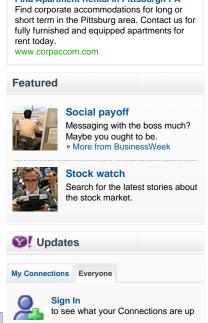
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**Entrepreneur Watch: Cazoodle Crawls Vertical Listings** 



Cazoodle, a new listings-based service, has launched from the incubator at The University of Illinois at Champaign-Urbana (yes, Marc Andreeson's former territory). The site currently crawls for apartment listings and shopping. Additional vertical categories such as events are anticipated, notes Professor Kevin Chang, who is supervising seven graduate students on the project. "We have the technology and we want to use it," he says.

The service started in San Francisco with apartments and added shopping afterwards. It now provides listings in those verticals in more than 20 markets. National coverage of apartments will begin shortly. The key to the service, says Chang, is a comprehensive set of crawled ads, and a better user experience that isn't dominated by showcased ads.

The landing pages of many vertical sites are "2/3 ads, 1/3 listings," he says. Cazoodle hopes to reverse the ratio (although it isn't actively selling ads at this point). The site also has an elegant integration with Google Street View and Maps.

Looking forward, Chang hopes to build direct relationships with major listers, such as managers of apartment communities. Direct relationships provide much better information than what you can get by crawling, he says. Ultimately, be believes that's a major differentiator. He also hopes to begin adding community information.

But the site is not without controversy (or maybe, there should be controversy). For instance, the site dives deep into the sites that it crawls. During mouseovers, it highlights a picture of the product or apartments, and full listing information.

Chang argues that Cazoodle isn't actually "deep linking" since the URLs of crawled sites are still highlighted, and only one picture is displayed. But in reality, there may not be much of a reason to visit the site of origination, given the easy "one stop" that his system provides.







Blog: Local Media Blog, Classifieds, Google, Verticals, Marketplaces Posted by: Peter Krasilovsky at 2:22 pm -

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# The News-Gazette.com

# Web site offers comprehensive look at apartments for rent

By Don Dodson

Monday December 1, 2008

CHAMPAIGN – Kevin Chang has developed a new way to find apartments on the Web, using University of Illinois research into how to conduct "deeper" Web searches.

The result is Cazoodle, a Web site that provides comprehensive listings of apartments in New York City, Chicago, Los Angeles and other metropolitan areas – including Champaign-Urbana.

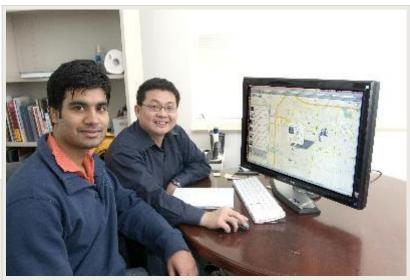
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Robert K. O'Daniell

Arpit Jain, left, and Kevin Chang show their apartment search Web site, Cazoodle, in their offices Tuesday at EnterpriseWorks in Champaign.

/web\_site\_offers\_comprehensive\_look\_at\_apartments\_for\_rent

### Comments

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# NCSA teams up with U.S. Army to devise smart Web crawling system

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released 12.05.08

By Erika Strebel

The surface Web is a vast ocean of millions of pages. People search the surface Web every day by putting keywords into search engines like Google or Yahoo! Search.

But when an Army trainer needs to quickly find information to put together a training session, a simple keyword search isn't always the most efficient way to navigate the surface Web. A search for "arms" would pull up everything from 19th century firearms to adjustable rate mortgages. A similar image search turns up a melee of pictures of octopus tentacles, family coats of arms and human appendages. It could take hours to refine a search—hours that a trainer may not have.

To address the need for more focused, faster searching, the Army and private companies teamed up with NCSA researchers.

NCSA's Alan Craig and graduate research assistant Yunliang Liang created a Web crawling system that allows users to create a searchable database of relevant pages and websites, search within that database and choose how to rank the results of that search. NCSA researcher Andrew Wadsworth oversaw the project and aided in designing both the search system and program user interface.

### **Getting started**

In October 2007, the U.S. Army and Vertex Solutions, a software engineering company that specializes in training software, approached NCSA with a proposal involving the creation of an information database for an Army training software prototype called Training Assistant.

"We evaluated several universities and other not-for-profit research groups," says Vertex representative Amanda Palla. "The combination of demonstrable expertise in the area of Web crawlers, the collaborative attitude of NCSA staff, and the proximity to Vertex's Champaign office made working with NCSA an easy decision for us."

### **Creating the crawler**

Craig had previously worked on a surface Web mining project called VIAS. VIAS was a Linux-based system that automatically created databases.

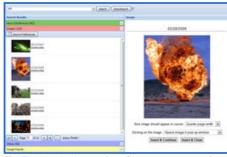
Rather than modify VIAS for the Army's needs, the NCSA team decided to create a new system based on open-source software. The Army wanted to work in Windows and Craig wanted to work with fresh technology.

To begin creating the database of surface Web content, a user needs to provide some keywords, keyword combinations, and several URLs as a starting point for the crawler. From there, the crawler can start searching the surface Web.

"Our goal was to present a much more focused database of information that we knew would be very pertinent to the needs of the Army trainer," says Craig.

The team started with a list of terms and URLs collected by





The Training Assistant also allows users to search for images within related databases and insert them into their training module material.



NCSA's team of researchers created a surface Web search system that lets trainers quickly find related text to insert into the software's text editor.



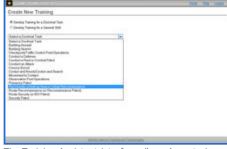
Army trainers can also use the Training Assistant's overlay map editor for training exercises. Trainees can draw and write on maps then compare them to the trainer's map.

Anna Cianciolo, researcher with Command Performance Research, Inc. She worked with Army personnel to define the key terms used to limit the database. The Army supplied websites and other examples of databases so the NCSA team could define exactly what the Army wanted.

"We basically gave it a lot of parameters of what we do and don't care about and where to start looking for info," says Craig.

The process of limiting the database seems straightforward, but it was one of more difficult parts of the project.

"Deciding what goes in or out of the database is a hard question," says Craig. "What goes into the database depends on who you talk to."



The Training Assistant interface allows Army trainers to choose the kind of training module they want to design.

Eventually, they decided to create two databases: one with tighter parameters and one with looser parameters. That

way, if a relevant page doesn't make it into the tighter database, the crawler will eventually find it.

The NCSA team also spent time tweaking the crawler's search functions to make sure irrelevant data didn't somehow slip into the databases.

"It's amazing what you'll catch," says Wadsworth. "It's like fishing: You never know what you're going to pull out."

The team examined the pages within the database, looking for irrelevant pages or relevant pages not included and determining what other terms needed to be added or excluded from the database parameters.

While the crawling system makes searching the surface Web faster and easier, it also observes online rules and etiquette.

"You can't just go on to MIT's Web site and pound it day and night," says Wadsworth. "You've got to be friendly and nice."

Instead of bombarding a relevant website with continuous hits, the crawler has been programmed to return to a website periodically to collect information.

"These Web crawlers need to comply to a set of rules and etiquette so it doesn't disturb any Web server out there and cause them to go crazy," Wadsworth says. "They can see what's hitting them."

In addition, the crawler works within parameters of the robots.txt file each website has. The file tells crawlers which website directories they may and may not access.

### More than crawling

But the NCSA system is more than just a crawler—it also analyzes the results it produces. The crawler has its own ranking system that the user can modify. It uses special algorithms to rank results so the best results come back.

"With the Army we wanted to be in control of what order we present the results in and how we present the results," says Craig.

Unlike Google and other commercial search engines, the crawler allows a user to define how results are ranked.

"The goal is to make it easier for the Army trainers so that they didn't have to go to Google and sift through 9 million results," says Craig.

They can choose to rank results by date, relevance, key term and domain name. In the case of the Training Assistant, the crawler can place results from .mil on a higher priority than those from a .com site.

"It's something easy, fast and all relative," says Wadsworth.

### **Putting it all together**

The NCSA team's Web crawler was integrated with the user interface that Vertex had designed.

Also, because the Army expressed an interest in mining the deep Web—the databases, live newsfeeds and data hidden behind form searches that makes a large segment of the data available online—Craig suggested collaboration with Cazoodle, a software company launched by former NCSA Faculty Fellow Kevin Chang, a professor in the University of Illinois Computer Science Department.

"Alan immediately realized, 'Why reinvent this? Let's go and see what (Cazoodle) has,'" says Wadsworth. "It was so beautiful, we couldn't ask for more."

By combining Vertex's interface with the two Web searching systems within Teaching Assistant, Army trainers using the software can copy text and images from search results of various databases within a single program.

"That's what was so golden about this, the ability to lift information right from the results," says Wadsworth.

Moreover, the different systems multitask during each search. The programs are integrated to allow various components of the Training Assistant to talk to each other and process a user's query. Thus, the Training Assistant can automatically refine a user's search and filter results.

Liang worked with Cazoodle programmer Paul Yuan to ensure that the search systems were compatible with each other and with the final Training Assistant program.

"It's not just a computer program talking to a human," says Craig. "While a human starts the process, there is a lot of integration of various systems to combine the results, rank them, and present them to the user."

### **Crawling in the future**

While the new surface Web crawling system was specifically made for the Army's Training Assistant, Craig wants to make the system more generally accessible.

The NCSA team is working on creating a user-friendly interface for the Web crawling system. Their goal is to create an interface so researchers can easily define their database limits and ranking heuristics without having to know detailed computer programming. They also are working on creating a friendly interface for accessing the resulting databases.

"What we want to do is generalize what we've built and make it broadly applicable to different NCSA communities and a resource for other projects," says Craig.

#### **Team members**

Kevin Chang, Computer Science Department Anna T. Cianciolo, Command Performance Research, Inc. Alan Craig, NCSA Yunliang Liang, NCSA Amanda Palla, Vertex Solutions Andrew Wadsworth, NCSA Tim Wentling, NCSA Paul Yuan, Cazoodle, Inc.









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