EXHIBIT B

IN THE UNITED STATES DISTRICT COURT
FOR THE DISTRICT OF DELAWARE

PERSONALIZED USER MODEL, L.L.P., Plaintiff, v. GOOGLE INC., Defendant.	)	C.A. No. 09-525-LPS **JURY TRIAL DEMANDED**
GOOGLE, INC. Counterclaimant, v. PERSONALIZED USER MODEL, LLP and YOCHAI KONIG Counterdefendants.	)	**PUBLIC VERSION**

DECLARATION OF ANDREA PALLIOS ROBERTS IN SUPPORT OF GOOGLE INC.'S MOTION FOR SUMMARY JUDGMENT

OF COUNSEL:

Charles K. Verhoeven
David A. Perlson
Eugene Novikov
QUINN EMANUEL URQUHART
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50 California St.
San Francisco, CA 94111
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Andrea Pallios Roberts
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Richard L. Horwitz (#2246)
David E. Moore (#3983)
POTTER ANDERSON & CORROON LLP
Hercules Plaza, 6th Floor
1313 N. Market Street
Wilmington, DE 19801
Tel: (302) 984-6000
rhorwitz@potteranderson.com
dmoore@potteranderson.com

Attorneys for Defendant Google Inc.

Dated: February 21, 2011
PUBLIC VERSION: February 28, 2011
1003119 / 34638

I, Andrea Pallios Roberts, declare as follows:

1. I am an attorney authorized to practice law in the State of California. I am an associate at Quinn Emanuel Urquhart & Sullivan, LLP, counsel of record for Defendant Google Inc. I have personal knowledge of the facts stated herein and if called to testify could and would competently testify thereto.

2. Attached as Exhibit 1 is a true and correct copy of a document dated April 8, 1996 and titled "Employment Agreement," produced to Google by SRI International in response Google's December 20, 2010 subpoena for documents.

3. Attached as Exhibit 2 is a true and correct copy of a document dated August 5, 1999, produced to Google by SRI International in response to Google's December 20, 2010 subpoena for documents.

4. Attached as Exhibit 3 is a true and correct copy of a printout of the web page displayed at *http://www.sri.com/about/* on February 18, 2011.

5. Attached as Exhibit 4 is a true and correct copy of a printout of the web page displayed at *http://www.sri.com/focus_areas/computing.html* on February 18, 2011.

6. Attached as Exhibit 5 is a true and correct copy of a printout of the web page displayed at *http://www.ai.sri.com/about* on February 18, 2011.

7. Attached as Exhibit 6 is a true and correct copy of cited excerpts of the December 2, 2010 deposition of Yochai Konig.

8. Attached as Exhibit 7 is a true and correct copy of a document produced by PUM to Google bearing control numbers PUM 0091910-15.

9. Attached as Exhibit 8 is a true and correct copy of a document produced by PUM to Google bearing control numbers PUM 0042214-35.

10. Attached as Exhibit 9 is a true and correct copy of a document produced by PUM to Google bearing control numbers PUM 0042165-87.

11. Attached as Exhibit 10 is a true and correct copy of cited excerpts of PUM's Eleventh Supplemental Responses to Google's First Set of Interrogatories, served on Google on December 1, 2010.

12. Attached as Exhibit 11 is a true and correct copy of a document produced by PUM to Google bearing control numbers PUM 0069186-89.

13. Attached as Exhibit 12 is a true and correct copy of cited excerpts of PUM's Responses to Google's First Set of Interrogatories, served on Google on March 8, 2010.

14. Attached as Exhibit 13 is a true and correct copy of cited excerpts of PUM's Fifth Supplemental Responses to Google's First Set of Interrogatories, served on Google on September 9, 2010.

15. Attached as Exhibit 14 is a true and correct copy of a letter from my colleague Eugene Novikov to PUM's counsel dated September 15, 2010.

16. Attached as Exhibit 15 is a true and correct copy of PUM's Seventh Supplemental Responses to Google's First Set of Interrogatories, served on Google on October 8, 2010.

17. Attached as Exhibit 16 is a true and correct copy of cited excerpts of the December 3, 2010 deposition of Roy Twersky.

18. On January 19, 2011, Google produced to PUM the [redacted] agreement between Google and SRI.

19. Attached as Exhibit 17 is a true and correct copy of a letter from Mr. Novikov to PUM's counsel dated January 29, 2011.

20. PUM asked to review a copy of Google's proposed amended answer, and Google provided PUM with a copy on January 27, 2010. Attached as Exhibit 18 is a true and correct copy of my cover email to PUM's counsel attaching the proposed amended answer.

21. Attached as Exhibit 19 is a true and correct copy of an email from me to PUM's counsel dated February 3, 2011.

22. Attached as Exhibit 20 is a true and correct copy of an email from PUM's counsel, Jennifer Bennett, to me dated February 8, 2011.

23. Attached as Exhibit 21 is a true and correct copy of PUM's Thirteenth Supplemental Responses to Google's First Set of Interrogatories, served February 8, 2011.

24. Attached as Exhibit 22 is a true and correct copy of an email dated January 30, 1999 from Yochai Konig to stolcke@speech.sri.com, produced to Google by SRI International in response to Google's December 20, 2010 subpoena for documents.

25. Attached as Exhibit 23 is a true and correct copy of an email dated June 8, 1998 from Yochai Konig to mw@speech.sri.com, produced to Google by SRI International in response to Google's December 20, 2010 subpoena for documents.

26. Attached as Exhibit 24 is a true and correct copy of a printout of the web page http://en.wikipedia.org/wiki/Machine_learning on February 18, 2011.

27. Attached as Exhibit 25 is a true and correct copy of the '040 patent.

28. Attached as Exhibit 26 is a true and correct copy of the '031 patent.

29. Attached as Exhibit 27 is a true and correct copy of the '276 patent.

I declare under penalty of perjury under the laws of the United States that the foregoing is true and correct.

Executed this 22nd day of February 2011, in San Francisco, California.

/s/ Andrea Pallios Roberts
Andrea Pallios Robert

EXHIBIT 1

In consideration of my employment at SRI International, I agree:

1. To perform the duties assigned to me to the best of my ability, and to abide faithfully by SRI policies and practices.

2. To treat as confidential all results, intermediate and terminal, of SRI research activity in which I may participate or of which I may obtain knowledge during my employment, together with all formulae, specifications, secret processes, trade secrets, and such other confidential information belonging to SRI or its clients as may come to my knowledge in the course of or incidental to my employment, and that I shall at all times recognize and protect such property rights of SRI and its clients and not disclose same to unauthorized persons. Because much of the work done by SRI for the Government is classified, I am aware that my continued employment may depend on my ability to qualify for and to maintain an appropriate Government clearance. I also agree that I will not divulge to any unauthorized persons any classified information revealed to me during the period of my employment, and that all classified material received or generated by me will be handled in accordance with SRI Security Guide. I further warrant that to the best of my knowledge I do not at the time of my employment have in my possession, or under my control, any material which contains "CLASSIFIED INFORMATION" as defined in U.S. Government Industrial Security directives.

3. To promptly disclose to SRI all discoveries, improvements, and inventions, including software, conceived or made by me during the period of my employment, and I agree to execute such documents, disclose and deliver all information and data, and to do all things which may be necessary or in the opinion of SRI reasonably desirable, in order to effect transfer of ownership in or to impart a full understanding of such discoveries, improvements and inventions to SRI or to its nominee and to no other. I agree to comply with every reasonable request of SRI, its nominee, or the representative of either, for assistance in obtaining and enforcing patents. I understand that termination of this employment shall not release me from my obligations hereunder (as well as paragraph 2 above) provided, however, that time actually spent by me in discharging these obligations after termination of my employment shall be paid for by SRI at a reasonable rate. It is, of course, understood and agreed that I accept no responsibility for any out-of-pocket fees, costs, or expenses incurred or involved in the preparation, filing or prosecution of any application for patent or in the prosecution or defense of any litigation involving the same, and that I shall be reimbursed by SRI for any expense to which I may be put at the request of it or its nominee hereunder. This agreement does not apply to an invention which fully qualifies for the exclusion under Section 2870 of the California Labor Code which is reprinted on the reverse side of this agreement. However, all such inventions must be disclosed so that a determination can be made that they do in fact qualify for exclusion. All such disclosures will be treated as confidential.

4. That with respect to the subject matter thereof, this agreement covers my entire agreement with SRI, superseding any previous oral or written understandings or agreements with SRI or any representative thereof.

5. That my employment is not for any particular term and therefore this agreement is terminable, with immediate effect, at the will of either party.

Executed at Menlo Park, California this 8 day of April, 1996

Jennie Collins
Witness to Signature

Konig
Staff Member

Print Name: YOCHAI KONIG

By: Gloria Gomez
Human Resources, for SRI International

CALIFORNIA STATE PATENT LAW

Article 3.5
Inventions Made by an Employee

§2870. Any provision in an employment agreement which provides that an employee shall assign or offer to assign any of his or her rights in an invention to his or her employer shall not apply to an invention for which no equipment, supplies, facility, or trade secret information of the employer was used and which was developed entirely on the employee's own time, and (a) which does not relate (1) to the business of the employer or (2) to the employer's actual or demonstrably anticipated research or development, or (b) which does not result from any work performed by the employee for the employer. Any provision which purports to apply to such an invention is to that extent against the public policy of this state and is to that extent void and unenforceable.

§2871. No employer shall require a provision made void and unenforceable by Section 2870 as a condition of employment or continued employment. Nothing in this article shall be construed to forbid or restrict the right of an employer to provide in contracts of employment for disclosure, provided that any such disclosures be received in confidence, of all of the employee's inventions made solely or jointly with others during the term of his or her employment, a review process by the employer to determine such issues as may arise, and for full title to certain patents and inventions to be in the United States, as required by contracts between the employer and the United States or any of its agencies.

§2872. If an employment agreement entered into after January 1, 1980, contains a provision requiring the employee to assign or offer to assign any of his or her rights in any invention to his or her employer, the employer must also, at the time the agreement is made, provide a written notification to the employee that the agreement does not apply to an invention which qualifies fully under the provisions of Section 2870. In any suit or action arising thereunder, the burden of proof shall be on the employee claiming the benefits of its provisions.

IF YOU HAVE ANY QUESTIONS ON THE ABOVE, PLEASE BE SURE THEY ARE ANSWERED BEFORE COMMENCING EMPLOYMENT.

EXHIBIT 2

MEMO

TO: Yochai Konig DATE: 7-31-99

FROM: Office of the General Counsel LOC: Menlo Park

SUBJECT: Your Termination and Sensitive Information

This memo is to remind you of your obligation to hold in confidence sensitive business and technical trade secret information of SRI International which you have been exposed to in the course of your employment at SRI.

During the time that you have been with SRI, you have necessarily received information which is useful and valuable to SRI and its clients, and is not generally known to persons outside SRI. It is particularly important to SRI that this information be appropriately protected. Consequently, as stated in your Employee Agreement, subsequent to your departure from SRI you have a continuing obligation not to use or to disclose such information to anyone.

Most likely you are already aware of the specific technical and business information that SRI considers to be a trade secret. Such information may be included in technical, scientific or business records, lab notebooks, notes, reports, blueprints, drawings, software and computer programs, client and vendor lists which should be left at SRI. If you have specific questions concerning what SRI considers to be trade secret information feel free to contact your direct supervisor or the Office of the General Counsel.

If in the future you desire to use or disclose any technical or business trade secret information that may be a trade secret of SRI, please contact us for written permission to use or to disclose it.

I have received and read a copy of this letter.

Konig (SJ)

Date: Aug 5, 1999

SRI Form:
NDA Separation-Nov.93

EXHIBIT 3

About Us

SRI International is an independent, nonprofit research institute conducting client-sponsored research and development for government agencies, commercial businesses, foundations, and other organizations. SRI also brings its innovations to the marketplace by licensing its intellectual property and creating new ventures.

For 65 years, since our beginnings when we were called Stanford Research Institute, our strengths have been our staff's world-leading expertise and passion for working with clients on important challenges. SRI is well known for its legacy of innovations in communications and networks, computing, economic development and science and technology policy, education, energy and the environment, engineering systems, pharmaceuticals and health sciences, homeland security and national defense, materials and structures, and robotics.

- **Facts & FAQs**
  Independent from Stanford University since 1970, SRI is a nonprofit scientific research institute formed under Section 501(c)(3) of the U.S. Internal Revenue Service and incorporated in the State of California. Get quick answers about SRI here. Also request or download our corporate overview brochures (Acrobat PDF) to get a look at who we are and how we meet important client needs.

- **Mission and Values**
  Read about our founding purpose, guiding principles, and values.

- **R&D Divisions**
  SRI is organized in five divisions, each with an interdisciplinary approach to meeting client needs.

- **SRI Five Disciplines of Innovation™**
  Learn about our rigorous approach to creating compelling value for our clients. SRI President and CEO Curt Carlson describes this approach his book, *Innovation: The Five Disciplines for Creating What Customers Want*.

- **A Legacy of Innovation**
  As early as the 1920s, several key steps led to SRI's creation in 1946. Since then, SRI's innovative contributions have changed the way people work, live, learn, and benefit from technology. Visit our 60th anniversary page, and browse our history and innovations timeline to learn about the major events of SRI's evolution into a leading research and development organization.

- **Clients**
  One way to judge the quality of an organization is by the company it keeps. SRI's client list includes a "who's who" of global corporations, strategic government agencies, and major foundations.

- **Staff and Management**
  Creating a culture that thrives on innovation demands a lot from the people who work at SRI. Our staff of about 2,100 provides the innovative thinking, R&D leadership, and passion for change that sets us apart. The contributions of our staff members are often acknowledged and awarded by technical and professional societies, national organizations, and by SRI itself.

- **Offices and Facilities**
  SRI's 65-acre main campus in Menlo Park has more than one million square feet of space. Our next largest locations are in Princeton, NJ and Washington, D.C. We have about 20 additional locations throughout the U.S. and offices in Tokyo and Hong Kong to stay close to the clients we serve.

- **SRI Ventures**
  SRI creates new spin-off businesses to capitalize on our technology and move it into the marketplace.

- **SRI at Conferences and Tradeshows**
  Stop by to see us at one of our upcoming appearances.

- **Community Activities**
  SRI participates in a range of local events and activities.

- **SRI International Sarnoff**
  SRI's subsidiary Sarnoff Corporation was fully integrated into SRI in January 2011. SRI International Sarnoff delivers vision, video, and semiconductor technology innovations that empower government and commercial clients to see/sense, understand, and control complex environments.

EXHIBIT 4

Computing

The pace of change in computing is dizzying, and SRI has been at the forefront since the beginning. Computer science at SRI includes more than 50 years of firsts, from magnetic ink character recognition that spawned electronic banking to the computer mouse and the Internet. Today, we are continuing to help clients meet the pressures of faster technology cycles and the needs for security and privacy.

Government and commercial clients benefit from our expertise in many areas, from basic and applied research to developing and testing advanced systems. Our researchers strive to understand the computational principles underlying intelligence in humans and machines to develop computer-based systems to solve problems. We develop pioneering technologies in these areas:

Computing sciences

- Computer Science Laboratory
- Formal methods and dependable systems
- Rewriting logics and systems
- Secure systems
- Database interoperability and security
- Dependable systems architectures
- Intrusion detection
- Networking
- Infrastructure security
- "Smart grid" technologies (PDF)
- DATES: Detection and Analysis of Threats to the Energy Sector (PDF)
- Technology in learning

Speech technologies

- Speech Technology and Research (STAR) Laboratory
- Natural language

Artificial intelligence

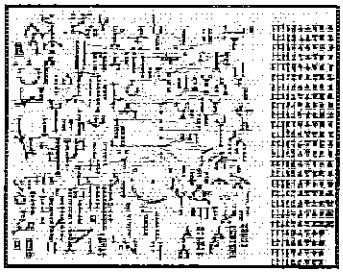
- Artificial Intelligence Center
- Collaborative robotics
- Integrated learning
- Mapping software for robotics
- Visual perception (machine vision, expert systems, evidential reasoning, and virtual reality)
- Representation and reasoning
- Bioinformatics
- Evolutionary systems biology

- Symbolic systems biology
- CALO - Cognitive Assistant that Learns and Organizes

For information about our work in related areas, visit SRI's Information and Computing Sciences Division and our Center for Technology in Learning in SRI's Policy Division.

EXHIBIT 5

About the AI Center



[Ecoli Yeast]

SRI International's Artificial Intelligence Center (AIC) is one of the world's major centers of research in artificial intelligence. Founded in 1966, the AIC has been a pioneer and a major contributor to the development of computer capabilities for intelligent behavior in complex situations. Its objectives are to understand the computational principles underlying intelligence in man and machines and to develop methods for building computer-based systems to solve problems, to communicate with people, and to perceive and interact with the physical world.

Because the AIC is an integral part of a nonprofit research institute, it can carry out comprehensive and effective long-term programs. The AIC's permanent staff includes one of the largest (approximately 94 computing professionals) and most highly trained (approximately 52 percent with a Ph.D. or its equivalent) groups of AI professionals in the world. At the same time, the Center provides the stimulation and creative exchange of ideas characteristic of an academic setting by maintaining associations with universities and other research groups and by providing opportunities for students and visiting fellows from the United States and abroad to participate in ongoing projects.

The AIC manages its own computing facilities of servers, workstations, laser printers, and specialized peripherals, linked by a multigigabit network connected to the Internet via a dedicated DS3 line (45 Mbps maximun transfer rate.) The approximately 150 servers in operation in the AIC run up to the latest versions of the Solaris, Linux and Windows operating systems.

All professional staff in the AIC have personally assigned laptops or desktop computer systems. In many cases, they have both a laptop and desktop system at their disposal.

The AIC has established a nucleus of long-term projects in the core areas of artificial intelligence, including: planning and problem solving; computer vision, image processing, and computer graphics; natural-language processing; AI engineering tools and languages; distributed systems; expert and knowledge-based systems; discourse and

communication; multisource information integration; automatic theorem proving and program synthesis; and autonomous robots.

EXHIBIT 6

THIS EXHIBIT HAS BEEN REDACTED IN ITS ENTIRETY

EXHIBIT 7

THIS EXHIBIT HAS BEEN REDACTED IN ITS ENTIRETY

EXHIBIT 8

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REDACTED IN ITS ENTIRETY

EXHIBIT 9

THIS EXHIBIT HAS BEEN REDACTED IN ITS ENTIRETY

EXHIBIT 10

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EXHIBIT 11

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EXHIBIT 12

THIS EXHIBIT HAS BEEN
REDACTED IN ITS ENTIRETY

EXHIBIT 13

THIS EXHIBIT HAS BEEN REDACTED IN ITS ENTIRETY

EXHIBIT 14

quinn emanuel trial lawyers | san francisco
50 California Street, 22nd Floor, San Francisco, California 94111-4788 | TEL: (415) 875-6600 FAX: (415) 875-6700

September 15, 2010

VIA EMAIL

Jennifer Bennett
Sonnenschein Nath & Rosenthal LLP
1530 Page Mill Road
Suite 200
Palo Alto, CA 94304-1125

Re: *Personalized User Model LLP v. Google Inc.*, C.A. No. 09-00525-JJF

Dear Jennifer:

I write regarding Plaintiff's September 9, 2010 supplementation of its response to Google's interrogatory no. 1.

First, it appears that PUM is attempting to rely on privileged documents to support a date of conception earlier than the date of the provisional application. Obviously, PUM may not rely on documents it is withholding on the basis of privilege. Please produce these documents.

Also, several of the privilege log entries for the cited documents supposedly proving an earlier date of conception include an individual named Thomas J. McFarlane. He does not appear on Plaintiff's initial disclosures. Please tell us who he is and supplement Plaintiff's disclosures and/or interrogatory response as necessary.

The interrogatory also requested that Plaintiff identify each person who worked on the development of the alleged inventions, describing each person's role and the dates of each person's contribution. Plaintiff's supplemental response does not address this part of the interrogatory. Please supplement, particularly as to the role and contribution of each of the named inventors to the alleged inventions, and the timeframe of any such contribution.

quinn emanuel urquhart & sullivan, llp
LOS ANGELES | 865 South Figueroa Street, 10th Floor, Los Angeles, California 90017-2543 | TEL (213) 443-3000 FAX (213) 443-3100
NEW YORK | 51 Madison Avenue, 22nd Floor, New York, New York 10010-1601 | TEL (212) 849-7000 FAX (212) 849-7100
SILICON VALLEY | 555 Twin Dolphin Drive, 5th Floor, Redwood Shores, California 94065-2139 | TEL (650) 801-5000 FAX (650) 801-5100
CHICAGO | 500 W. Madison Street, Suite 2450, Chicago, Illinois 60661-2510 | TEL (312) 705-7400 FAX (312) 705-7401
LONDON | 16 Old Bailey, London EC4M 7EG, United Kingdom | TEL +44(0) 20 7653 2000 FAX +44(0) 20 7653 2100
TOKYO | Akasaka Twin Tower Main Bldg., 6th Floor, 17-22 Akasaka 2-Chome, Minato-ku, Tokyo 107-0052, Japan | TEL +81 3 5561-1711 FAX +81 3 5561-1712
MANNHEIM | Erzbergerstraße 5, 68165 Mannheim, Germany | TEL +49(0) 621 43298 6000 FAX +49(0) 621 43298 6100

Finally, the interrogatory asks about facts relating to the reduction to practice of the alleged invention. Plaintiff's response does not address reduction to practice at all. Please supplement, including to identify whether the invention was ever actually reduced to practice, when it was reduced to practice, who was involved, and the details of any diligence Plaintiff contends occurred between the conception and alleged reduction to practice.

Sincerely,

/s/

Eugene Novikov

EXHIBIT 15

THIS EXHIBIT HAS BEEN REDACTED IN ITS ENTIRETY

EXHIBIT 16

THIS EXHIBIT HAS BEEN
REDACTED IN ITS ENTIRETY

EXHIBIT 17

quinn emanuel trial lawyers | san francisco
50 California Street, 22nd Floor, San Francisco, California 94111-4788 | TEL: (415) 875-6600 FAX: (415) 875-6700

WRITER'S DIRECT DIAL NO.
(415) 875-6308

WRITER'S INTERNET ADDRESS
eugenenovikov@quinnemanuel.com

January 19, 2011

VIA EMAIL

Jennifer Bennett
SNR Denton LLP
1530 Page Mill Road
Suite 200
Palo Alto, CA 94304-1125

Marc Friedman
Mark C. Nelson
SNR Denton LLP
1221 Avenue of the Americas
New York, NY 10020-1089

Re: *Personalized User Model LLP v. Google Inc.*, C.A. No. 09-00525-JJF

Dear Counsel:

As indicated in the agreement being transmitted with this letter, Google has acquired SRI International's ownership rights in the patents-in-suit, as well as U.S. Patent 7,320,031.

Google seeks to amend its Answer to bring a counterclaim for a declaratory judgment against Personalized User Model LLP, a claim for breach of contract against Yochai Konig, and any other claims that may be necessary and appropriate to assert and give full effect to Google's ownership rights in these patents.

Please let us know by Friday if Plaintiff will consent to Google amending its Answer to assert these claims. As you represent Mr. Konig, and as he is a representative of PUM as indicated at the claim construction hearing, please also let us know by Friday if Mr. Konig will consent to

being subject to personal jurisdiction in Delaware for purposes of this action. If Mr. Konig will not so consent, Google will move to dismiss for failure to join an indispensable party, and/or file an action against Mr. Konig in California and move to stay this case.

Please let me know if you have any questions.

Sincerely,

/s/

Eugene Novikov

EXHIBIT 18

Andrea P Roberts

From: Andrea P Roberts
Sent: Thursday, January 27, 2011 5:45 PM
To: Bennett, Jennifer D.
Cc: Google-PUM; Horwitz, Richard L.; Moore, David E.
Subject: RE: PUM v. Google
Attachments: 3926712_Google Amended Answer and Ownership Counterclaims.doc

Jennifer,

Attached is a draft of the amended answer for your review. There are a few cite holes to be filled in, but that should not affect your review. Please promptly let us know whether PUM will consent to the filing of the attached.

Thanks,

Andrea

Andrea Pallios Roberts
Quinn Emanuel Urquhart & Sullivan, LLP

555 Twin Dolphin Drive, 5th Floor
Redwood Shores, CA 94065
650-801-5023 Direct
650.801.5000 Main Office Number
650.801.5100 FAX
andreaproberts@quinnemanuel.com
www.quinnemanuel.com

From: Bennett, Jennifer D. [mailto:jennifer.bennett@snrdenton.com]
Sent: Thursday, January 20, 2011 7:28 PM
To: Eugene Novikov
Cc: Google-PUM
Subject: PUM v. Google

Gene-

Please see the attached correspondence.

Thanks,

Jennifer D. Bennett
Managing Associate
SNR Denton US LLP
D +1 650 798 0325
jennifer.bennett@snrdenton.com
snrdenton.com

SNR DENTON

EXHIBIT 19

Andrea P Roberts

From: Andrea P Roberts
Sent: Thursday, February 03, 2011 5:55 PM
To: Bennett, Jennifer D.
Cc: Google-PUM; rhorwitz@Potteranderson.com; Moore, David E.
Subject: PUM v. Google

Jennifer,

I write regarding paragraph 6 of the September 29, 2010 Stipulated Amended Scheduling Order, which provides that no case dispositive motion may be filed early without leave of Court. Please let us know whether PUM and Mr. Konig will stipulate to Google filing a motion for summary judgment on patent ownership and standing issues prior to the date set forth in paragraph 6 for dispositive motions. As our amended pleading makes clear, there is no genuine issue of material fact as to the threshold issues of ownership and standing, making these issues appropriate for early resolution on summary judgment. Please let us know by Monday whether PUM and Mr. Konig agree so that we know whether to move forward with this motion.

Thanks,

Andrea

Andrea Pallios Roberts
Quinn Emanuel Urquhart & Sullivan, LLP

555 Twin Dolphin Drive, 5th Floor
Redwood Shores, CA 94065
650-801-5023 Direct
650.801.5000 Main Office Number
650.801.5100 FAX
andreaproberts@quinnemanuel.com
www.quinnemanuel.com

EXHIBIT 20

Andrea P Roberts

From: Bennett, Jennifer D. [jennifer.bennett@snrdenton.com]
Sent: Tuesday, February 08, 2011 10:24 AM
To: David Perlson; Andrea P Roberts
Cc: Google-PUM; rhorwitz@Potteranderson.com; Moore, David E.
Subject: RE: PUM v. Google

David,

Can you please give us more detail regarding what exactly Google intends to move on?

Thanks,

Jennifer D. Bennett
Managing Associate
SNR Denton US LLP
D +1 650 798 0325
jennifer.bennett@snrdenton.com
snrdenton.com

SNR DENTON

From: David Perlson [mailto:davidperlson@quinnemanuel.com]
Sent: Monday, February 07, 2011 3:03 PM
To: Bennett, Jennifer D.; Andrea P Roberts
Cc: Google-PUM; rhorwitz@Potteranderson.com; Moore, David E.
Subject: RE: PUM v. Google

Jennifer, the request is relatively straightforward. When you say a few days, what do you have in mind? This is a threshold issue that we would like to get before the Court as soon as possible. Thanks

From: Bennett, Jennifer D. [mailto:jennifer.bennett@snrdenton.com]
Sent: Monday, February 07, 2011 10:36 AM
To: Andrea P Roberts
Cc: Google-PUM; rhorwitz@Potteranderson.com; Moore, David E.
Subject: RE: PUM v. Google

Andrea.

PUM is considering Google's request and will get back to you in a few days.

Thanks,

Jennifer D. Bennett
Managing Associate
SNR Denton US LLP
D +1 650 798 0325

SNR DENTON

jennifer.bennett@snrdenton.com
snrdenton.com

From: Andrea P Roberts [mailto:andreaproberts@quinnemanuel.com]
Sent: Thursday, February 03, 2011 5:55 PM
To: Bennett, Jennifer D.
Cc: Google-PUM; rhorwitz@Potteranderson.com; Moore, David E.
Subject: PUM v. Google

Jennifer,

I write regarding paragraph 6 of the September 29, 2010 Stipulated Amended Scheduling Order, which provides that no case dispositive motion may be filed early without leave of Court. Please let us know whether PUM and Mr. Konig will stipulate to Google filing a motion for summary judgment on patent ownership and standing issues prior to the date set forth in paragraph 6 for dispositive motions. As our amended pleading makes clear, there is no genuine issue of material fact as to the threshold issues of ownership and standing, making these issues appropriate for early resolution on summary judgment. Please let us know by Monday whether PUM and Mr. Konig agree so that we know whether to move forward with this motion.

Thanks,

Andrea

Andrea Pallios Roberts
Quinn Emanuel Urquhart & Sullivan, LLP

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www.quinnemanuel.com

EXHIBIT 21

THIS EXHIBIT HAS BEEN REDACTED IN ITS ENTIRETY

EXHIBIT 22

Main Identity

From: "Yochai Konig" <konig@speech.sri.com>
To: <stolcke@speech.sri.com>
Sent: Saturday, January 30, 1999 8:10 PM
Subject: 1998 Review

Hi Andreas,

I attach to this email my self-review for 1998. Please let me know if more information is need (e.g., papers) before our review meeting. Also please let me know when it would be convenient for you to meet.

Thanks,

--Yochai

1. 1998 Goals

My research in 1998 was centered around a data-driven approach for feature extraction for pattern recognition. By ``data-driven feature extraction'' I mean the automatic extraction of features that optimize recognition performance. Feature extraction can be viewed as selecting a transformation from the original input space (e.g., digitized speech samples) to a smaller-dimension space. My approach of choosing this transformation according to recognition performance is in contrast to current feature extraction methods. This approach was applied to both speech recognition and speaker verification.

2. Speaker Verification

In speaker verification we study a nonlinear discriminant analysis (NLDA) technique that extracts a speaker-discriminant feature set. Our approach is to train a multilayer perceptron (MLP) to maximize the separation between speakers by nonlinearly projecting a large set of acoustic features (e.g., several frames) to a lower-dimensional feature set. The extracted features are optimized to discriminate between speakers and to be robust to mismatched training and testing conditions. We train the MLP on a development set and apply it to the training and testing utterances. Our results show that by combining the NLDA-based system with a state of the art cepstrum-based system we improve the speaker verification performance on the 1997 and 1998 NIST Speaker Recognition Evaluation sets by 15\% in average compared with our cepstrum-only system.

Achievements & Papers:

A. Part of the SRI team which officially won the 1998 speaker ID evaluations sponsored by NSA.

B. Publication and presentation at: Proc. RLA2C-ECSA, Speaker Recognition and its commercial and forensic applications, Avignon, France, April, 1998

- Konig, Y., Heck, L., Weintraub, M., and Sonmez, K., ``Nonlinear Discriminant Feature Extraction for Robust Text-Independent Speaker Recognition"

- Heck, L., and Konig, Y., ``Discriminative Training of Minimum Cost Speaker Verification Systems"

C. Submitted (with Larry, Kemal and Mitch) an extended version of `Nonlinear Discriminant Feature Extraction for Robust Text-Independent Speaker Recognition" paper to a special issue of Speech Communication magazine, following a selection process based on the best papers in the RLA2C conference. The two papers mentioned above were selected as a combined paper.

4. Speech Recognition

(Joint work with Mitch and Francoise)

- Approach

Our approach is to optimize all system components to maximize the posterior probability of the correct sentence. Our emphasis in this study is on the selection and estimation of the front-end model according to recognition performance. We optimize sentence-level measures and not frame-level measures. Specifically, we optimize the feature extraction process to increase the posterior probability of the correct sentence or of a specific cost function in case of a different error metric than word error rate (WER). We search for the optimal transformation from primitive features (e.g., FFT) to input features to HMM/GMM.

- Status

We derived and implemented an LVCSR system which jointly optimizes front-end and acoustic model according to sentence level criterion. This is the first time that a sentence level criterion was applied in a LVCSR system for optimizing front-end parameters. We explored research issues such as optimization criterion, MLP input features, GMM organization, Batch vs. Stochastic procedure. We obtained good performance for gender classification. However we achieved only modest gains for LVCSR with low capacity system - 1 Gaussian per class. Currently we continue this work in the context of the Marines

database. In addition, we extended this work to context dependent models.

- Publications

A. Beaufays, F., Weintraub, M., and Konig, Y., ``DYNAMO: An algorithm for Dynamic Acoustic Modeling",
In Proc. Broadcast News Transcription and Understanding Workshop (BNTU), Landsdowne, VA, February, 1998.

B. Beaufays, F., Weintraub, M., Konig, Y.,
``Discriminative Mixture Weight Estimation for Large Gaussian Mixture Models", to appear in IEEE International Conference on Acoustics, Speech and Signal Processing (ICASSP), Tempa, AZ, March, 1999.

5. Projects - proposal writing

A. Proposed (as a PI) and awarded $200k for the IDEAS project based on the data - driven idea.

B. Took part in the LVCSR proposal (wrote two sections), joint work with Mitch, Andreas, and Francoise.

6. 1999 Goals

A. Continting and extending my work on data-driven feature extraction both for speech recognition and speaker verification.

B. Exploring and studying statistical-based speech understanding.

EXHIBIT 23

Main Identity

From: "Yochai Konig" <konig@speech.sri.com>
To: <mw@speech.sri.com>
Sent: Monday, June 08, 1998 10:56 AM
Subject: Ideas Proposal
*** EOOH ***
Return-Path: <konig@speech.sri.com>
Date: Mon, 8 Jun 1998 11:56:49 -0700
From: Yochai Konig <konig@speech.sri.com>
To: mw@speech.sri.com
Subject: Ideas Proposal

Hi Mitch,

Here is the draft for the ideas proposal.

--Yochai

DATA-DRIVEN FEATURE EXTRACTION
Yochai Konig and Mitch Weintraub
STAR LAB

Introduction

This draft proposal for the IDEAS program describes a data-driven approach for feature extraction for pattern recognition. The proposed approach has the potential to lead to major improvements in both speech recognition and speaker recognition performance as well as for other pattern recognition applications. In the speech recognition field feature extraction techniques such as vocal tract normalization (VTL), and optimized front-ends have all led to significant improvements as reported in the recent Large Vocabulary Continuous Speech Recognition (LVCSR) meetings by BBN, Dragon and SRI [LVCSR_nov97,LVCSR_may97]. In speaker recognition our work on data-driven features resulted in extracted features that are optimized to discriminate among speakers and to be robust to mismatched training and testing conditions. These features significantly improve speaker verification performance on the 1997 NIST Speaker Recognition Evaluation set compared with our cepstrum-only system \cite{konig_rla2c} and led to SRI officially winning the 1998 speaker ID evaluations sponsored by NSA.

We propose a data-driven approach for feature extraction for pattern

recognition. What we mean by ``data-driven feature extraction" is the automatic extraction of features that optimize recognition performance. Feature extraction can be viewed as selecting a transformation from the original input space (e.g., digitized speech samples) to a smaller-dimension space. Our approach of choosing this transformation according to recognition performance is in sharp contrast to current feature extraction methods. Current techniques of feature extraction for speech recognition are knowledge-based methods that are based on auditory models (for example [seneff1986,Seneff88,ghitza1987]), perception theories [hermansky90], and signal processing considerations. The linkage to recognition performance is achieved by training systems with the proposed features and experimentally setting the technique's parameters.

The proposed feature extractor is data-driven in the sense that the extractor parameters are automatically estimated from (development) data, rather than being constrained to perform a specific function (e.g., spectral analysis). The advantages of the data-driven approach over traditional approaches which define an algorithm that compute a specific feature and than performing a trial and error of evaluating performance on a development set for each new set of features:

1. The search space for the optimal features is not constrained to a hand-tuned specific function which can lead to more discriminant features, thus, improved performance.

2. The process is automatic in contrast to the manual tedious trail and error process of optimizing current feature extraction methods.

The need for better and more discriminant features is driven by the overlapping distributions of the current models. This was, for example demonstrated by BBN in the May 1996 workshop [LVCSR_may96]. BBN reported in that meeting that the number of mixture components that contribute significant mass to a frame's probability is large and that even the simplest (triphone - state) distributions tend to cover a significant portion of the space given enough training material. However current techniques for optimizing front-ends and features are inefficient, and usually involve a trial and error process. Several researchers have suggested the incorporation of data-driven ideas in the feature extraction process. Rahim, Bengio, and LeCun suggested optimizing a set of parallel class-specific (e.g., phones) networks performing feature transformation based on the

minimum classification (MCE) criterion for telephone-based connected digit recognition [rahim97]. Fontaine, Ris, and Boite used the two-hidden-layer multilayer perceptron (MLP) to perform nonlinear discriminant analysis (NLDA) for isolated-word, large-vocabulary speech recognition tasks [fontaine97]. The training criterion for the MLPs was phonetic classification. Bengio and his colleagues suggested a global optimization of a neural network-hidden Markov (HMM) hybrid, where the outputs of the neural network constitute the observation sequence for the HMM [bengio92].

Approach

For speech recognition the novelty in our proposed approach is that we plan to go beyond cepstral representation for the input features to the feature extraction. The desired features will be extracted from local information such as the fast Fourier transform (FFT) points, global information such as speaking rate, and signal to noise ratio (SNR). We will take a large number of inputs and nonlinearly project them to a lower dimensional space based on a recognition criterion in common with some of the previous work. Our work with data-driven feature extraction methods works well for speaker verification tasks and shows potential for LVCSR tasks [konig_rla2c,LVCSR_nov97].

For speaker verification tasks, we have trained an MLP to maximize the separation between speakers by nonlinearly projecting a large set of acoustic features (e.g., several frames) to a lower-dimensional feature set. The extracted features are optimized to discriminate among speakers and to be robust to mismatched training and testing conditions. We train the MLP on a development set and apply it to the training and testing utterances. Our results show that by combining the system trained on the discriminantly extracted features, with a state-of-the-art cepstrum-based system, we improve speaker verification performance on the 1997 NIST Speaker Recognition Evaluation set by 15% in average compared with our cepstrum-only system [konig_rla2c]. However, our experiments with a similar approach for LVCSR tasks has yielded only marginal improvements so far. The main differences between the speaker-recognition tasks and the LVCSR experiments are that:

1. The training criterion for the feature extraction in the speaker verification task is the same as the overall performance measure, i.e., accuracy of speaker recognition. In the LVCSR experiments the training criterion for the feature extraction was single state phone discrimination, which differs from our overall goal of sentence recognition. Furthermore, the mismatch was even larger given that we used tristate triphones as our basic modeling unit and not single state phone as was the measure for the feature extraction.

2. In the speaker verification study we used other features in addition to

cepstrum as inputs to the feature extraction process (e.g., estimation of pitch). This did not occur in the LVCSR task.

Based on these differences we propose a new approach for data-driven feature extraction for LVCSR tasks. This new approach provides solutions as follows

1. To overcome the mismatch between the feature extraction training criterion and the overall recognition performance criterion in, we propose to optimize feature extraction according to recognition performance. We will optimize sentence level measures and not frame level measures. Specifically, we will optimize the feature extraction process to increase the posterior probability of the correct sentence or of a specific cost function in case of a different error metric than word error rate (WER).

2. We plan to go beyond the cepstrum for the input features to feature extraction. Specifically, we plan to use the fast FFT points themselves (same information as the speech samples). In addition we will use features that reflect global correlation of the test data speaker, dialect, and channel, and we will perform nonlinear dimension reduction based on recognition performance.

Research Issues

An important research question is what should be the inputs to the feature extraction process. We plan to use the FFT points (both the real and imaginary parts) for a large window of speech as inputs. By using FFT points we make no assumptions about the nature of the extracted features because FFT points carry exactly the same information as speech samples. We will initialize the MLP by training it to map from the FFT points to the cepstral features. The reasoning for using FFT points instead of speech samples as inputs to the MLP is that FFT points have internal repeatable order (as opposed to the waveform where a shift in time of several samples will drastically change the representation). We can train an MLP to approximate any function given enough training patterns and enough hidden units [neural_comp].

The input representation to the MLP can be augmented to (a) include other types of information, and (b) to make the representation more efficient. To include other types of information, we plan to augment the input to the MLP with longer term or global information. Information such as such as time derivatives of the cepstral parameters, speaking rate, VTL, hidden state variables (see section on long-term correlation modeling), and signal to noise ratio (SNR) can also be used as input features to the MLP.

To make the representation more efficient, we plan to study techniques to find minimal configurations of the feature extractor. The training

of the MLP to map from an input feature such as the FFT to a cepstral feature vector is feasible (since we can use an infinite amount of data to train this mapping). However, the unknown variable is the number of MLP parameters that are needed to perform this task. If the number of parameters is too large, this will make it difficult to move away from the initial MLP-implementation of the cepstral transformation with a limited amount of labeled data (the training speech corpus). Therefore, a critical part of the research is how to efficiently encode the discriminative information with a minimal number of parameters. One way to make the representation more efficient is to include additional knowledge sources as inputs to the MLP (e.g. FFT energies, original cepstral representation) as well as use algorithms for model selection. Model selection is well studied [brain_damage,moody_94]. However in the speech community the problem of automatic model selection based on recognition performance has not been extensively studied.

Another important research area is the interaction with model parameter estimation (e.g. HMM output distributions). We propose to study a joint optimization of the model parameters and the features at the frame level is better than an iterative procedure similar in nature to the expectation maximization (EM) [dempster77] Based on these research issues and to be concrete we outline two sample studies for our approach.

Sample Study 1

We plan to start from the FFT points for a large window of speech as inputs to our feature extractor. Initially, we will train an MLP to map these FFT points to a standard feature vector (e.g., 10 cepstral coefficients and their first and second time derivatives) for a good initialization point. In the second stage we will back-propagate the error into this MLP with the criterion of maximizing the posterior probability of the correct sentence, by using a stochastic gradient approach. After the training, we will then have a transformation of the FFT points into a new feature vector (i.e., the output of the MLP) that we can use to process our data. A natural augmentation for the input features is the incorporation of global input features that involve longer time correlations reflecting speaking rate, accent, and channel estimation.

Sample Study 2

We will adapt the model parameters (such as means and variances) in addition to the features, according to the same criterion of increasing the posterior probability of the correct sentence. We will experiment to determine whether the joint optimization of the model parameters and the features will be at the frame level or iterative in nature (similar to expectation maximization EM).

EXHIBIT 24

Machine learning

From Wikipedia, the free encyclopedia

Machine learning, a branch of artificial intelligence, is a scientific discipline that is concerned with the design and development of algorithms that allow computers to evolve behaviors based on empirical data, such as from sensor data or databases. A learner can take advantage of examples (data) to capture characteristics of interest of their unknown underlying probability distribution. Data can be seen as examples that illustrate relations between observed variables. A major focus of machine learning research is to automatically learn to recognize complex patterns and make intelligent decisions based on data; the difficulty lies in the fact that the set of all possible behaviors given all possible inputs is too large to be covered by the set of observed examples (training data). Hence the learner must generalize from the given examples, so as to be able to produce a useful output in new cases. Machine learning, like all subjects in artificial intelligence, requires cross-disciplinary proficiency in several areas, such as probability theory, statistics, pattern recognition, cognitive science, data mining, adaptive control, computational neuroscience and theoretical computer science.

Contents

Definition

> A computer program is said to **learn** from experience E with respect to some class of tasks T and performance measure P, if its performance at tasks in T, as measured by P, improves with experience E.[1]

Generalization

The core objective of a learner is to generalize from its experience.[2] The training examples from its experience come from some generally unknown probability distribution and the learner has to extract from them something more general, something about that distribution, that allows it to produce useful answers in new cases.

Human interaction

Some machine learning systems attempt to eliminate the need for human intuition in data analysis, while others adopt a collaborative approach between human and machine. Human intuition cannot, however, be entirely eliminated, since the system's designer must specify how the data is to be represented and what mechanisms will be used to search for a characterization of the data.

Algorithm types

Machine learning algorithms are organized into a taxonomy, based on the desired outcome of the algorithm.

- **Supervised learning** generates a function that maps inputs to desired outputs. For example, in a classification problem, the learner approximates a function mapping a vector into classes by looking at input-output examples of the function.
- **Unsupervised learning** models a set of inputs, like clustering.
- **Semi-supervised learning** combines both labeled and unlabeled examples to generate an appropriate function or classifier.
- **Reinforcement learning** learns how to act given an observation of the world. Every action has some impact in the environment, and the environment provides feedback in the form of rewards that guides the learning algorithm.
- **Transduction** tries to predict new outputs based on training inputs, training outputs, and test inputs.
- **Learning to learn** learns its own inductive bias based on previous experience.

Theory

Main article: Computational learning theory

The computational analysis of machine learning algorithms and their performance is a branch of theoretical computer science known as computational learning theory. Because training sets are finite and the future is uncertain, learning theory usually does not yield absolute guarantees of the performance of algorithms. Instead, probabilistic bounds on the performance are quite common.

In addition to performance bounds, computational learning theorists study the time complexity and feasibility of learning. In computational learning theory, a computation is considered feasible if it can be done in polynomial time. There are two kinds of time complexity results. Positive results show that a certain class of functions can be learned in polynomial time. Negative results show that certain classes cannot be learned in polynomial time.

There are many similarities between machine learning theory and statistics, although they use different terms.

Approaches

Main article: List of machine learning algorithms

Decision tree learning

Main article: Decision tree learning

Decision tree learning uses a decision tree as a predictive model which maps observations about an item to conclusions about the item's target value.

Association rule learning

Main article: Association rule learning

Association rule learning is a method for discovering interesting relations between variables in large databases.

Artificial neural networks

Main article: Artificial neural network

An artificial neural network (ANN), usually called "neural network" (NN), is a mathematical model or computational model that tries to simulate the structure and/or functional aspects of biological neural networks. It consists of an interconnected group of artificial neurons and processes information using a connectionist approach to computation. Modern neural networks are non-linear statistical data modeling tools. They are usually used to model complex relationships between inputs and outputs or to find patterns in data.

Genetic programming

Main articles: Genetic programming and Evolutionary computation

Genetic programming (GP) is an evolutionary algorithm-based methodology inspired by biological evolution to find computer programs that perform a user-defined task. It is a specialization of genetic algorithms (GA) where each individual is a computer program. It is a machine learning technique used to optimize a population of computer programs according to a fitness landscape determined by a program's ability to perform a given computational task.

Inductive logic programming

Main article: Inductive logic programming

Inductive logic programming (ILP) is an approach to rule learning using logic programming as a uniform representation for examples, background knowledge, and hypotheses. Given an encoding of the known background knowledge and a set of examples represented as a logical database of facts, an ILP system will derive a hypothesized logic program which entails all the positive and none of the negative examples.

Support vector machines

Main article: Support vector machines

Support vector machines (SVMs) are a set of related supervised learning methods used for classification and regression. Given a set of training examples, each marked as belonging to one of two categories, an SVM training algorithm builds a model that predicts whether a new example falls into one category or the other.

Clustering

Main article: Cluster analysis

Cluster analysis or clustering is the assignment of a set of observations into subsets (called *clusters*) so that observations in the same cluster are similar in some sense. Clustering is a method of unsupervised learning, and a common technique for statistical data analysis.

Bayesian networks

Main article: Bayesian network

A Bayesian network, belief network or directed acyclic graphical model is a probabilistic graphical model that represents a set of random variables and their conditional independencies via a directed acyclic graph (DAG). For example, a Bayesian network could represent the probabilistic relationships between diseases and symptoms. Given symptoms, the network can be used to compute the probabilities of the presence of various diseases. Efficient algorithms exist that perform inference and learning.

Reinforcement learning

Main article: Reinforcement learning

Reinforcement learning is concerned with how an *agent* ought to take *actions* in an *environment* so as to maximize some notion of long-term *reward*. Reinforcement learning algorithms attempt to find a *policy* that maps *states* of the world to the actions the agent ought to take in those states. Reinforcement learning differs from the supervised learning problem in that correct input/output pairs are never presented, nor sub-optimal actions explicitly corrected.

Applications

Applications for machine learning include machine perception, computer vision, natural language processing, syntactic pattern recognition, search engines, medical diagnosis, bioinformatics, brain-machine interfaces and cheminformatics, detecting credit card fraud, stock market analysis, classifying DNA sequences, speech and handwriting recognition, object recognition in computer vision, game playing, software engineering, adaptive websites, robot locomotion, and structural health monitoring.

Machine learning techniques helped win a major software competition: in 2006, the online movie company Netflix held the first "Netflix Prize" competition to find a program to better predict user preferences and beat its existing Netflix movie recommendation system by at least 10%. The AT&T Research Team BellKor won over several other teams with their machine learning program called Pragmatic Chaos. After winning several minor prizes, it won the 2009 grand prize competition for $1 million.[3]

Software

RapidMiner, KNIME, Weka, ODM, Shogun toolbox, Orange and Apache Mahout are software suites containing a variety of machine learning algorithms.

Journals and conferences

- *Machine Learning* (journal)
- *Journal of Machine Learning Research*
- *Neural Computation* (journal)
- International Conference on Machine Learning (ICML) (conference)
- Neural Information Processing Systems (NIPS) (conference)
- List of upcoming conferences in Machine Learning and Artificial Intelligence (conference)

See also

- Computational intelligence
- Data mining
- Explanation-based learning
- Important publications in machine learning
- Multi-label classification
- Pattern recognition
- Predictive analytics

References

1. ^ Tom M. Mitchell (1997) Machine Learning p.2
2. ^ Christopher M. Bishop (2006) *Pattern Recognition and Machine Learning*, Springer ISBN 0-387-31073-8.
3. ^ "BelKor Home Page" research.att.com

Further reading

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- Ethem Alpaydın (2004) *Introduction to Machine Learning (Adaptive Computation and Machine Learning)*, MIT Press, ISBN 0262012111
- Bing Liu (2007), *Web Data Mining: Exploring Hyperlinks, Contents and Usage Data.* Springer, ISBN 3540378812
- Toby Segaran, *Programming Collective Intelligence*, O'Reilly ISBN 0-596-52932-5
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External links

- Ruby implementations of several machine learning algorithms
- Andrew Ng's Stanford lectures and course materials
- The Encyclopedia of Computational Intelligence
- International Machine Learning Society
- Kmining List of machine learning, data mining and KDD scientific conferences
- Machine Learning Open Source Software
- Machine Learning Video Lectures
- Open Source Artificial Learning Software
- The Computational Intelligence and Machine Learning Virtual Community
- R Machine Learning Task View
- Machine Learning Links and Resources
- Idiap Research Institute - Links and Resources
- OpenCV implementations of several machine learning algorithms part of OpenCV (open source computer vision library)