

School of Social Work
Department of Computer Science
Jordan Institute for Families
University of North Carolina, Chapel Hill
Chapel Hill, NC 27599

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EDUCATION

University of North Carolina, Chapel Hill, NC

Doctor of Philosophy, Department of Computer Science, August 2004
“Approximate Mining of Consensus Sequential Patterns”
Advisor: Wei Wang (Computer Science) & Dean F. Duncan (Social Work)
Minor : *Master of Social Work*, School of Social Work, December 1998
Macro & Policy concentration, Certificate in Nonprofit Leadership and Management
Master of Science, Department of Computer Science, May 1997

Yonsei University, Seoul, Korea

Bachelor of Science, Department of Computer Science, August 1995
“Conditional Data Breakpoints in GDB”
Advisor : Sung-Bong Yang (Yonsei) & Susan Graham (UC, Berkley)

University of California, Berkeley, CA

Exchange Program, Department of EECS Fall 1993 – Spring 1994

RESEARCH INTERESTS

- Social welfare and health intelligence and informatics using government administrative data; Decision support systems for state and local government agencies; Knowledge management of government administrative data; Analysis and synthesis of government administrative data for policy analysis, program management, evaluation, and research
- Digital Government; Government information systems
- KDD (Knowledge Discovery in Databases), Data Mining, Sequential Analysis, Database Systems
- Entity Resolution, Record Linkage

RESEARCH EXPERIENCE

University of North Carolina Chapel Hill, NC July 2004 - present

Research Assistant Professor : Social of Social Work (Jordan Institute for Families)

Adjunct Assistant Professor : Dept of CS (Social Welfare Intelligence and Informatics Group)

- KDD information systems for government administrative data; Decision support systems for local and state government agencies; Welfare and health intelligence and informatics;
- <http://ssw.unc.edu/ma>; <http://wwwx.cs.unc.edu/~kum/swiig/>
- Data integration; Research technology for linking information from various different welfare systems to enable analysis across the various social welfare programs when the varied systems do not share a common id; Deterministic approximate record linkage algorithms; Incremental algorithms to update links over time; Privacy preserving linkage systems
- Supervise RAs : PhD students, MSW students, MS students, and undergraduate students

University of North Carolina

Chapel Hill, NC

July 2004

Dissertation Research : Dept of CS & SSW Advisor: Wei Wang (CS) & Dean Duncan (SW)

- ApproxMAP (for APPROXimate Multiple Alignment Pattern mining) : As a versatile exploratory data analysis tool, ApproxMAP uncovers the underlying trend in databases composed of sequence of sets. It is able to organize and compress huge high dimensional sequential databases into something that is viewable by people by detecting the consensus patterns in the database.
- <http://www.unc.edu/~kum/approxMAP/>

- University of North Carolina** Chapel Hill, NC December 1998 - July 2004
Graduate Research Assistant : Social of Social Work Supervisor: Dean Duncan
- Jordan Institute for Families:
 - Data analysis and synthesis for policy analysis and evaluation using NC state's social welfare administrative data
 - Design several longitudinal database systems to track the experiences of individuals and families in NC receiving various welfare benefits (Work First, Food and Nutrition Services, Medicaid, Child Welfare) by integrating information from the various NC state's social welfare systems
 - Develop several web-based information systems that managers and staff in county departments of social services across the state can use to track and observe the outcome for individuals and families in North Carolina

- University of North Carolina** Chapel Hill, NC
Graduate Research Assistant: Department of Computer Science
- Collaboration Bus: Prasun Dewan (Spring 98)
 - Designed and implemented a "real-time" support module for non-multimedia collaborative applications which reduces jitter in multi-user environments.
 - Decomposition of parallel algorithms using the BSP model: Lars Nyland (Summer 96)
 - Studied the various spatial decomposition techniques for parallel algorithms in dynamic molecular simulations using the BSP model.
 - Distributed WWW Search Using Semantic Routers: John Smith (Spring 96 - Summer 96)
 - Designed and implemented a search engine for the Internet that has a scaleable distributed architecture based on DNS technology.

- Bellcore : Bell Communications Research** Redbank, NJ June 94 - Jan 95
Intern Supervisor : Mari Maeda
- Designed and implemented an ATM/SONET network management system prototype

- University of California** Berkeley, CA Fall 1993 – Spring 1994
Undergraduate Research Assistant: Department of EECS
- Conditional Data Breakpoints in GDB: Susan Graham (Spring 94)
 - Implemented the conditional data breakpoint into GDB
 - OPTICAL: Optics and Topography Involving the Cornea And Lens: Brian Barsky (Spring 94)
 - Designed and implemented visualization tools for OPTICAL

TEACHING EXPERIENCE

- University of North Carolina** Chapel Hill, NC Summer 2000
Instructor : Department of Computer Science
- Course Taught: Power Tools for the Mind
 - Performed all planning, teaching, and grading in the course, which covers how computers work; problem-solving skills; algorithms and programming; potential use and abuse in society.

- University of North Carolina** Chapel Hill, NC Fall 1995 – Fall 1998
Graduate Teaching Assistant: Department of Computer Science
- Graduate Courses : Fall96 (Networking and Distributed Systems); Fall 98 (Algorithm Analysis)
 - Undergraduate Courses : Fall 95 & Spring 97 (Data Structures; C & C++); Fall 97 (Introduction to Programming; Java. Taught the recitation sections);

- University of California** Berkeley, CA Fall 1993 – Spring 1994
Tutor: Computer Science Self-Paced Center
- Tutor and grade homework and exams of lower level undergraduate students in learning how to program through self-paced classes; <http://inst.eecs.berkeley.edu/~selfpace/index.shtml>

PROFESSIONAL EXPERIENCE

- DB designer for social welfare services data management
 - Developed numerous integrated database systems to track various social welfare programs
 - Heart-to-Heart Community Center (Seoul, Korea) : Community Center (May 98 - Aug 98)
 - Help Age, Korea (Seoul, Korea) : International NGO for the elderly (May 98 - Aug 98)
 - Interact (Raleigh, NC, USA) : Domestic Violence Agency (Feb 96 - Apr 96)
- The Womens' Center, Chapel Hill, NC August 1997 – May 1998
 - MSW placement
 - A member of the team of three people who started Teens Climb High (TCH), an empowerment program for girls in low-income communities in Chapel Hill and Carrboro
 - <http://www.womenspace.org/tchweb/index.html>

GRANTS AND AWARDS

- Co-PI (July 2007-June 2011): Creating Indicators and Improving Outcomes: Analytic Assistance for Child Welfare, Work First, Food and Nutrition Services, and Employment and Training and Career Start in NC. **NC-DHHS, North Carolina Division of Social Services**. \$3,531,787
- Investigator (March 2011-Feb 2012): Reimbursement policy changes and its effect on local public health service outcomes. **Robert Wood Johnson Foundation Public Health Practice Based Research Network**. \$150,000
- Co-PI (July 2005-June 2007): Assessing Performance in Work First. **NC-DHHS, North Carolina Division of Social Services**. \$440,855
- Senior Investigator (2005-2008): Extended Employment Outcomes for Youth Aging Out of Foster Care. Assistant Secretary for Planning and Evaluation, **US Department of Health and Human Services**, through a sub-contract with **Urban Institute**.
- Senior Investigator (July 2004 - June 2007): Assistance in Assessing Child Welfare Outcomes. **NC-DHHS, North Carolina Division of Social Services**
- Senior Investigator (July 2004 - June 2007): Evaluation of the NC Food Stamp Employment and Training Initiative. **NC-DHHS, North Carolina Division of Social Services**
- Senior Investigator (July 2004-June 2005): Assessing Performance in Work First. **NC-DHHS, North Carolina Division of Social Services**.

GRANTS AND AWARDS IN SUBMISSION/PREPRATION

- PI : **NSF CISE Cross-Cutting Programs FY2011**. SHB: Privacy Preserving Linkage for Broad Health Research in a Restricted Access Environment Through Decoupling and Encryption. \$500,000.
- Co-PI : **NSF NSF-Census Research Network FY2011**. NCRN-SN: A Glass Box Approach for Linking Administrative Records: Merging Census and EPA Business Data. \$445,998.

PUBLICATIONS*Datamining and Data Analysis Peer-Reviewed Journal and Conference Articles*

- Barth, R. P., Duncan, D.F., Hodorowicz, M. T., & **Kum, H.C.**, (2010). Felonious Arrests of Former Foster Care and TANF-Involved Youth. *Journal of the Society for Social Work and Research (JSSWR)*. 1:pp104-123.
- Chang, J.H., & **Kum, H.C.** "Frequency-based load shedding over a data stream of tuples," (2009), *Information Sciences*. 179 (21) pp3733-3744. Oct 2009.
- **Kum, H.C.**, Chang, J.H., & Wang, W. (2007) "Benchmarking the Effectiveness of Sequential Pattern Mining Methods," *Data & Knowledge Engineering (DKE)*, 60(1):pp30-50.
- **Kum, H. C.**, Chang, J. H., & Wang, W. (2007) "Intelligent Sequential Pattern Mining via Alignment: Optimization Techniques for Very Large Databases," *Lecture Notes in Artificial Intelligence 4426 (PAKDD 2007)*, Z.-H. Zhou, H. Li, and Q. Yang (Eds.): pp. 587–597. Springer-Verlag Berlin Heidelberg.

- **Kum, H. C.**, Chang, J. H., and Wang, W. (2006) "Sequential Pattern Mining in Multi-Databases via Multiple Alignment," *Data Mining and Knowledge Discovery (DMKD)*, 12(2-3): pp151-180.
- **Kum, H. C.**, Paulsen, S., & Wang, W. (2005). "Comparative Study of Sequential Pattern Mining Models," *Foundations of Data Mining and Knowledge Discovery. Series: Studies in Computational Intelligence, Vol. 6 (ICDM workshop on FDM)* Lin, T.Y.; Ohsuga, S.; Liau, C.-J.; Hu, X.T.; Tsumoto, S. (Eds.) pp43-70.
- **Kum, H. C.**, Pei, J., Wang, W., & Ducan. D. (2003). ApproxMAP: Approximate Mining of Consensus Sequential Patterns. *Proc of the 3rd SIAM Intl. Conf. on Data Mining (SIAM 2003)*
- Nyland, L., Prins, J., Yun, R. H., Hermans, J., **Kum, H. C.**, & Wang L. (1998). Modeling Dynamic Load Balancing in Molecular Dynamics to Achieve Scalable Parallel Execution. *IRREGULAR*, pp356-365
- Nyland, L., Prins, J., Yun, R. H., Hermans, J., **Kum, H. C.**, & Wang L. (1997). Achieving Scalable Parallel Molecular Dynamics Using Dynamic Spatial Domain Decomposition Techniques. *Journal of Parallel and Distributed Computing*, V47, pp127-138.

Government Information Systems Peer-Reviewed Journal and Conference Articles

- **Kum, H. C.**, Duncan, D. F., & Stewart, C. J. (2009). Supporting Self-Evaluation in Local Government via KDD. *Government Information Quarterly: Building the Next-Generation Digital Government Infrastructures*, 26(2):pp 295-304, April 2009, Elsevier. Selected for publication from *Proc. of the 9th Nat'l Conf. on Digital Government Research (DGO 2008)*.
- Duncan, D. F., **Kum, H. C.**, Weigensberg, E. C., Flair, K.A., & Stewart, C. J. (2008). Informing Child Welfare Policy and Practice: Using Knowledge Discovery and Data Mining Technology via a Dynamic Web Site. *Child Maltreatment*, 13(4):pp 383-391.
- **Kum, H. C.**, Duncan, D. F., Flair, K.A., & Wang, W. (2004). Successfully Adopting IT for Social Welfare Program Management. *Proc. of the 4th Nat'l Conf. on Digital Government Research (DGO 2004)*. Seattle, WA, May 2004.
- **Kum, H. C.**, Duncan, D. F., & Wang, W. (2004). Understanding Social Welfare Service Patterns Using Sequential Analysis. *Proc. of the 4th Nat'l Conf. on Digital Government Research (DGO 2004)*. Seattle, WA, May 2004.
- **Kum, H. C.**, Duncan, D. F., Flair, K.A., & Wang, W. (2003). Social Welfare Program Administration and Evaluation and Policy Analysis Using Knowledge Discovery and Data Mining (KDD) on Administrative Data. *Proc. of the 3rd Nat'l Conf. on Digital Government Research (DGO 2003)*. Boston, MA, May 2003.

Datamining and Data Analysis Peer-Reviewed Conference Presentations

- **Kum, H. C.**, Duncan, D. F., Bowers, H., & Cambridge, D. (2009). Linking across multiple databases with less than perfect data. *The 12th Nat'l Child Welfare Data and Technology Conf. (NRC-CWDT)*. June 2009.
- Duncan, D. F., **Kum, H. C.**, & Barth, R. (2008). Employment and Felonious Arrests of Former Foster Care Youth. *The 11th National Child Welfare Data and Technology Conference (NRC-CWDT)*. July 2008.
- Macomber J., McDaniel, M., Cuccaro-Alamin S., & **Kum, H.C.** (2007). Linking Child Welfare & Employment Data: Assessing Extended Outcomes for Youth Aging Out of Foster Care. *The 10th National Child Welfare Data and Technology Conference (NRC-CWDT)*. July 2007.
- Duncan, D. F., Flair, K. A., & **Kum, H. C.** (2007). NC Food Stamp Website – A County Tool for Targeting Underserved Populations. *The 47th Annual National Association for Welfare Research and Statistics Workshop and Conference (NAWRS)*, Charleston, WV.
- Duncan, D. F., Dyke, A., Dylan, M., **Kum, H. C.** & Park, N. S. (2000). Do Welfare Recipients Really Vote With Their Feet: Intrastate Migration and Welfare Reform in NC. *The annual meeting of the Association for Public Policy Analysis and Management (APPAM)*, Seattle, WA Nov 2000.
- **Kum, H. C.**, & Prasun, D. (2000). Supporting Real-Time Collaboration Over Wide Area Networks. *CSCW 2000 Video Program*.

Government Information Systems Peer-Reviewed Conference Presentations and Demonstrations

- **Kum, H. C.** Meyer, D. Ahn, H., Rolock, N., Gabel, G.(2011). Roundtable on Building and Maintaining An Effective Information System of Administrative Data at Universities in Partnership with State Agencies. *Annual Conf. on Society for Social Work and Research (SSWR)*. Jan 2011.
- **Kum, H. C.** (2011). An Effective Model for Using Administrative Data to Inform Social Services Policy, Practice, and Management. *Annual Conf. on Society for SW and Res (SSWR)*. Jan 2011.
- **Kum, H. C.**, Duncan, D. F., & Flair, K. A. (2008). A Dynamic Website for County Level Child Welfare Outcome Measures. *Proc. of the 9th Nat'l Conf. on Digital Government Res (DGO 2008)*. Montreal Canada. May 2008.
- Duncan, D. F., **Kum, H. C.**, & Johnson, K. (2006). Effectively Sharing Information with 100 counties. *The 9th National Child Welfare Data and Technology Conf. (NRC-CWDT)*. July 2006.
- **Kum, H. C.**, Duncan, D. F., Flair, K. A., & Wang, W. (2004). Adopting IT for Effective Management of Social Welfare Programs. *Proc. of the 4th Nat'l Conf. on Digital Government Research (DGO 2004)*. Seattle, WA, May 2004.
- **Kum, H. C.**, Duncan, D. F., & Flair, K. A. (2003). Management Assistance for Work First via a Dynamic Website. *Proc. of the 3rd Nat'l Conf. on Digital Gov't Res. (DGO 2003)*. Boston, MA.
- Duncan, D. F., & Flair, K. A., Hallberg, R., **Kum, H. C.**, & Marshall, S. (2000). Bringing it to the Desktop: Assessing Welfare Reform Performance Over the Web. *Annual National Association for Welfare Research and Statistics Workshop and Conference (NAWRS) 2000*.

Invited Articles, Talks, and Reports

- **Kum, H.C.** (2011). Building a secure federated government KDD information system from the bottom up for child welfare practice, policy, and research. *Child Welfare 360° : Child Welfare and Technology*. Center for Advanced Studies in Child Welfare.
- **Kum, H.C.** (2009). ApproxMAP: Intelligent Sequential Pattern Mining via Alignment. *SAS 12th Annual Data Mining Conference: M2009*.
- Duncan, D.F., **Kum, H.C.**, Macomber J., Cuccaro-Alamin S., & Kuehn, D. (2008). Coming of Age: Employment Outcomes for Youth Who Age Out of Foster Care Through Their Middle Twenties. *The 11th National Child Welfare Data and Technology Conference (NRC-CWDT)*. July 2008. Report published for Assistant Secretary for Planning and Evaluation (ASPE), US Department of Health and Human Services (HHS), through a sub-contract with the Urban Institute <http://aspe.hhs.gov/hsp/08/fosteremp/>

HONORS, AWARDS, & PROFESSIONAL ACTIVITIES

- 2004: The UNC-CH Graduate School's Dissertation Fellowship – Royster Fellows
- 2003: The UNC-CH Graduate School's Dean's Award
- ACM International Conference on Digital Government Research (DGO) :
 - Demo/Poster co-Chair : 2010, 2011
 - Program committee : 2009, 2010, 2011
- Reviewer : *Data and Knowledge Engineering Journal (DKE)*, *Knowledge and Information Systems (KAIS)*, *IEEE Transaction on Knowledge and Data Engineering (TKDE)*. *ACM Transactions on Knowledge Discovery from Data (TKDD)*. *Information Sciences*. *ACM Computing Surveys*. *The Computer Journal of Oxford Press*. *Applied Stochastic Models in Business and Industry*.
- Member: The Digital Government Society of North America (DGSNA), ACM SIGKDD (Special Interest Group on KDD), ACM SIGMOD (Special Interest Group on Management of Data), Society of Social Work and Research (SSWR)

SKILLS

- C, C++, Java, HTML, ASP, php, ColdFusion, Lisp, Pascal, Turing, Prolog, 80386 assembly, BASIC
- SAS (base SAS, SAS/STAT, SAS/IntrNet, macro programming), SPSS, mysql, Access, Foxpro
- UNIX, LINUX, XENIX, Windows, NT, MS-DOS, Macintosh
- Bilingual in Korean and English.
- Worked in culturally diverse settings and have experience with diverse populations

REFERENCES

Computer and Information Science References

Wei Wang, Professor
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Eduard Hovy
Director of the Natural Language Group, USC Information Sciences Institute
Research Associate Professor, Computer Science, University of Southern California, Los Angeles
Co-Director for Research, DHS CCICADA Center of Excellence, Rutgers, USC, and UIUC
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Social Work References

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