

## Hye-Chung Kum

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- Research Interests**
1. KDD (Knowledge Discovery in Databases), Data Mining, Database Systems
  2. Digital Government
  3. Social welfare policy and program analysis using KDD (Knowledge discovery in databases) technology on social welfare administrative data
- Education**
- Ph. D. Computer Science, University of North Carolina, Chapel Hill Aug 1995 – Aug 2004
  - MSW School of Social Work Dec 1998
  - MS Computer Science May 1997
  - Certificate in Nonprofit Leadership and Management May 1999
  - BS Computer Science, Yonsei University, Seoul, Korea Aug 1995
  - EECS 1993-1994, (Exchange Program) University of California, Berkeley Aug 1993 - May 1994
  - SAS class of 1990 (Singapore American High School) May 1990
- International Journal Articles**
- J.H. Chang, & H.C. Kum, "Frequency-based load shedding over a data stream of tuples," (2009), *Information Sciences*. Jan 2009 online. doi= 10.1016/j.ins.2009.01.014.
  - H.C. Kum,, D. Duncan, & C. J. Stewart. (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.
  - H.C. Kum,, D. F. Duncan, E. C. Weigensberg, K. A. Flair, & C. J. Stewart. (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. Nov 2008. Sage.
  - H.C. Kum, J.H. Chang, & W. Wang. (2007) "Benchmarking the Effectiveness of Sequential Pattern Mining Methods," *Data & Knowledge Engineering*, 60(1):pp30-50. Jan 2007.
  - H.C. Kum, J.H. Chang, & W. Wang. (2006) "Sequential Pattern Mining in Multi-Databases via Multiple Alignment," *Data Mining and Knowledge Discovery*, 12(2-3): pp151-180. May 2006.
  - L. Nyland, J. Prins, R. H. Yun, J. Hermans, H. C. Kum, & L. Wang (1998). Modeling Dynamic Load Balancing in Molecular Dynamics to Achieve Scalable Parallel Execution. *IRREGULAR*, pp356-365
  - L. Nyland, J. Prins, R. H. Yun, J. Hermans, H. C. Kum, & L. Wang (1997). Achieving Scalable Parallel Molecular Dynamics Using Dynamic Spatial Domain Decomposition Techniques. *Journal of Parallel and Distributed Computing*, V47, pp127-138.
- Referred Conference Publications**
1. H.C. Kum,, D. F. Duncan, H. Bowers, & D. Cambridge. (2009). Linking across multiple databases with less than perfect data. *The 12th National Child Welfare Data & Technology Conference (NRC-CWDT)*. June 2009.
  2. H.C. Kum,, D. Duncan, & C. J. Stewart. (2008). Supporting Self-Evaluation in Local Government via KDD. *Proc. of the 9th Nat'l Conf. on Digital Government Res (DGO)*. Montreal Canada. May 2008.
  3. H.C. Kum,, D. Duncan, & K. Flair. (2008). A Dynamic Website for County Level Child Welfare Outcome Measures. *Proc. of the 9th Nat'l Conf. on Digital Gov't Res (DGO)*. Montreal Canada. May 2008.
  4. D. F. Duncan, H. C. Kum, J. Macomber, S. Cuccaro-Alamin, & D. Kuehn. (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. <http://www.urban.org/url.cfm?ID=1001174>.
  5. D. Duncan, H. C. Kum, & R. Barth. (2008). Employment and Felonious Arrests of Former Foster Care Youth. *The 11th National Child Welfare Data and Technology Conference (NRC-CWDT)*. July 2008.
  6. J. Macomber, M. McDaniel, S. Cuccaro-Alamin, & H. C. Kum. (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.
  7. D. Duncan, K. Flair, & H. C. Kum (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.
  8. D. Duncan, H. C. Kum, & K. Johnson. (2006). Effectively Sharing Information with 100 counties. *The 9th National Child Welfare Data and Technology Conference (NRC-CWDT)*. July 2006.

9. H.C. Kum, D. Duncan, K. Flair, and W. Wang. (2004). Successfully Adopting IT for Social Welfare Program Management. *Proc of the 4th National Conf on Digital Gov't Res.(DGO 2004)*. Seattle, WA, May 2004.
10. H.C. Kum,, Dean Duncan, and Wei Wang. (2004). Understanding Social Welfare Service Patterns Using Sequential Analysis. *DGO 2004*. Seattle, WA, May 2004.
11. H.C. Kum,, D. Duncan, K. Flair, and W. Wang. (2004). Adopting IT for Effective Management of Social Welfare Programs. *DGO 2004*. Seattle, WA, May 2004.
12. H.C. Kum,, J. Pei, W. Wang, and D. Duncan. (2003). ApproxMAP: Approximate Mining of Consensus Sequential Patterns. *Proc. of the 3rd SIAM Intl. Conf. on Data Mining*. SF, May 2003.
13. H.C. Kum,, D. Duncan, K. Flair, and W. Wang. (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 Res*. Boston, MA, May 2003.
14. H.C. Kum,, D. Duncan, and K. Flair. (2003). Management Assistance for Work First via a Dynamic Website. *Proc. of the 3rd Nat'l Conf. on Digital Government Research*. Boston, MA, May 2003.
15. D. Duncan, A. Dyke, M. Dylan, H. C. Kum, and N. S. Park. (2000) Do Welfare Recipients Really Vote With Their Feet:Intrastate Migration and Welfare Reform in North Carolina. *The annual meeting of the Association for Public Policy Analysis and Management (APPAM)*, Seattle, WA Nov 2000.
16. D. Duncan, K. Flair, R. Hallberg, H. C. Kum, and S. Marshall. (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*.
17. D. Duncan, K. Flair, R. Hallberg, H. C. Kum, S. Muller. (2000). Developing a Dynamic Web Site for Public Policy Data using SAS/IntrNet®. *SUGI 2000*.Hye-Chung (Monica) Kum and Prasun Dewan (2000). Supporting Real-Time Collaboration Over Wide Area Networks. *CSCW 2000 Video Program*.

## Book Chapters

- H.C. Kum, J.H. Chang, & W. Wang. (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.
- H.C. Kum, S. Paulsen, & W. Wang. (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.
- H.C. Kum, J. Pei, W. Wang, and D. Duncan. (2002). "ApproxMAP : Approximate Mining of Consensus Sequential Patterns." Technical Report TR02-031, UNC-CH, 2002. Published in *Mining Sequential Patterns from Large Data Sets*. Springer Series: The Kluwer International Series on Advances in Database Systems, Vol. 28. Wang, W. & Yang, J. pp 138-160.

## Research Experience

### School of Social Work, Jordan Institute for Families, Univ. of North Carolina, Chapel Hill (July 2004 – current)

- Research Assistant Professor (July 2004-current)
- Co-PI (July 2008-current): *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*, North Carolina Division of Social Services.
- Co-PI (July 2005-June 2008): *Assessing Performance in Work First*, North Carolina Division of Social Services.
- Investigator (July 2004 - June 2008): Assistance in Assessing Child Welfare Outcomes
- Investigator (July 2004 - June 2008): Evaluation of the NC Food Stamp Employment and Training Initiative
- Policy analysis and evaluation using NC state's social welfare administrative data by applying technology from KDD (Knowledge Discovery in Databases) as well as research new methods for analysis of such data.
- Research technology for approximate record linking for linking information from various different welfare systems to enable analysis across the various social welfare programs
- Supervise graduate RAs to build and use administrative data for research
- <http://ssw.unc.edu/ma>

### Department of Computer Science, University of North Carolina, Chapel Hill (Aug 2006 – current)

- \* Adjunct Assistant Professor
- \* In collaboration with Wei Wang, continues to research and publish on the topic of sequential pattern mining
- \* Supervise graduate and undergraduate RA

Jordan Institute for Families: Dean Duncan (Winter 98 – June 2004)

- Research Assistant
- Design several longitudinal database systems to track the experiences of individuals and families in North Carolina receiving various welfare benefits (such as Work First, Foodstamp, Medicaid, Child Welfare) by weaving together information from numerous administrative data from the NC state's social welfare system.
- 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 NC.

Ph.D. Dissertation: Wei Wang & Dean Duncan (Fall 98 - Spring 2004)

- \* 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.cs.unc.edu/~kum/approxMAP/>

Collaboration Bus: Prasun Dewan (RA in 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 (RA in Spring 96 - Summer 96)

- \* Designed and implemented a search engine for the Internet that has a scaleable distributed architecture based on DNS technology.

Conditional Data Breakpoints in GDB: Susan Graham & Sung-Bong Yang (Spring 94, Spring 95)

- \* 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.

**Previous  
Work  
Experience**

DB designer for social services data management

- Developed numerous comprehensive 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 ]

Intern at Bellcore (Redbank, NJ) : June 94 - Jan 95

- \* Designed and implemented an ATM/SONET network management system prototype

**Teaching  
Experience**

1. Instructor for COMP4 - Power Tools for the Mind: UNC-CH (Summer 2000)
2. TA for numerous undergraduate and graduate Computer science classes.

**Skills**

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

**Honors &  
Professional  
Activities**

- Program committee for the ACM International Conference on Digital Government Research (DGO)
- Referee for journals: *Data and Knowledge Engineering Journal*, *Knowledge and Information Systems*
- The UNC-CH Graduate School's Dissertation Competition Fellowship – Royster Fellows: 2003
- The UNC-CH Graduate School's Dean's Award: 2003
- Licensed social worker in Korea: June 1999
- The Digital Government Society of North America (DGSNA)
- ACM SIGKDD (Special Interest Group on KDD): 1999-2000
- ACM SIGMOD (Special Interest Group on Management of Data): 1999-2000
- ARNOVA (The Association for Research on Nonprofit Orgs & Voluntary Action): 1997
- NASW (National Association of Social Workers): 1997-1998