

# CURRICULUM VITAE

Dr. Gregory J. Hamerly

Last update: 2018/02/02

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## Education

- Doctor of Philosophy in Computer Science June, 2003  
University of California, San Diego  
Advisor: Charles Elkan  
Dissertation: “Learning structure and concepts in data through data clustering”
- Master of Science in Computer Science June, 2001  
University of California, San Diego
- Bachelor of Science in Computer Science (magna cum laude) June, 1999  
California Polytechnic State University, San Luis Obispo

## Academic employment history

- Associate Professor September, 2010 - present  
Department of Computer Science, Baylor University  
Graduate program director (2011 - 2017)
- Assistant Professor September, 2004 - 2010  
Department of Computer Science, Baylor University
- Postdoctoral research appointment September, 2003 – July, 2004  
Department of Computer Science, Katholieke Universiteit Leuven (Belgium)
- Lecturer Summer 2002  
Department of Computer Science, California Polytechnic University, San Luis Obispo

## Professional employment history

- Developer – Scroll AB 2013 - present
- Machine learning researcher and software developer – Mohomine, Inc. 2000 - 2001
- Software developer intern – Netscape Communications Corporation Summer 1997
- Software developer intern – DigitalStyle Corporation Summer 1996
- Website programmer – ElectriCiti Corporation Summer 1995

## Scholarly activity

### Refereed publications (Journal and Proceedings)

1. Petr Ryšavý and **Greg Hamerly**. **Geometric methods to accelerate k-means algorithms**. SIAM Conference on Data Mining (SDM), 2016.
2. Pablo Rivas-Perea, Erich Baker, **Greg Hamerly**, and Bryan F. Shaw. **Detection of leukocoria using a soft fusion of expert classifiers under non-clinical settings**. In BMC Ophthalmology, 2014.
3. Jonathan Drake and **Greg Hamerly**. **Accelerated  $k$ -means with adaptive distance bounds**. In OPT 2013: the 5th NIPS workshop on optimization for machine learning, 2012.
4. **Greg Hamerly** and Greg Speegle. **Efficient model selection for large-scale nearest-neighbor data mining**. In the *British National Conference on Databases (BNCOD)*, 2010.
5. **Greg Hamerly**. **Making  $k$ -means even faster**. In *Proceedings of the SIAM International Conference on Data Mining*, 2010.  
**Acceptance rate:** 23.4%.
6. Bing Yin and **Greg Hamerly**. **Hierarchical stability-based model selection for clustering algorithms**. In *Proceedings of the 2009 International Conference on Machine Learning and Applications*, 2009.  
**Acceptance rate:** 46%.
7. Joshua Johnston and **Greg Hamerly**. **Improving SimPoint accuracy for small simulation budgets with EDCM clustering**. In *Proceedings of 2nd workshop on Statistical and Machine learning approaches to Architecture and compilaTion (SMART'08)*, January 2008.  
**Acceptance rate:** 70%.
8. Erez Perelman, Jeremy Lau, Harish Patil, Aamer Jaleel, **Greg Hamerly**, and Brad Calder. **Cross binary simulation points**. In *2007 IEEE International Symposium on Performance Analysis of Systems and Software, ISPASS 2007*, pages 179–189, March 2007.  
**Acceptance rate:** 30.3%.
9. Yu Feng and **Greg Hamerly**. **PG-means: learning the number of clusters in data**. In Bernhard Schölkopf, John C. Platt, and Thomas Hoffman, editors, *Advances in Neural Information Processing Systems 19, Proceedings of the Twentieth Annual Conference on Neural Information Processing Systems*, pages 393–400, December 2006.  
**Acceptance rate:** 24%.
10. **Greg Hamerly**, Erez Perelman, Jeremy Lau, Tim Sherwood, and Brad Calder. **Using machine learning to guide architecture simulation**. *Journal of Machine Learning Research (JMLR)*, 7:343–378, February 2006.  
**Impact factor:** 3.116 (ranked 11/92 in Artificial intelligence).  
**Acceptance rate:** 27%.
11. **Greg Hamerly**, Erez Perelman, and Brad Calder. **Comparing multinomial and k-means clustering for simpoint**. In *2006 IEEE International Symposium on Performance Analysis of Systems and Software, ISPASS 2006*, pages 131–142. IEEE Computer Society, 2006.  
**Acceptance rate:** 29.6%.

12. **Greg Hamerly**, Erez Perelman, Jeremy Lau, and Brad Calder. **SimPoint 3.0: Faster and more flexible program phase analysis.** *Journal of Instruction-Level Parallelism (JILP)*, September 2005.  
Acceptance rate: ~22%.
13. **Greg Hamerly**, Erez Perelman, Jeremy Lau, and Brad Calder. **SimPoint 3.0: Faster and more flexible program analysis.** In *In proceedings of the Workshop on Modeling, Benchmarking and Simulation (MoBS)*, June 2005.  
Acceptance rate: 50%.
14. Jeremy Lau, Jack Sampson, Erez Perelman, **Greg Hamerly**, and Brad Calder. **The strong correlation between code signatures and performance.** In *Proceedings of the IEEE international symposium on performance analysis of systems and software (ISPASS)*, pages 236–247, 2005.  
Acceptance rate: 29%.
15. Jeremy Lau, Erez Perelman, **Greg Hamerly**, Tim Sherwood, and Brad Calder. **Motivation for variable length intervals to find hierarchical phase behavior.** In *IEEE International Symposium on Performance Analysis of Systems and Software, ISPASS 2005*, pages 135–146, 2005.  
Acceptance rate: 29%.
16. John Seng and **Greg Hamerly**. **Exploring perceptron-based register value prediction.** In *Proceedings of the second value-prediction and value-based optimization workshop*, pages 10–16. International conference on Architectural Support for Programming Languages and Operating Systems (ASPLOS-XI), October 2004.  
Acceptance rate: 67%.
17. **Greg Hamerly** and Charles Elkan. **Learning the  $k$  in  $k$ -means.** In Sebastian Thrun, Lawrence K. Saul, and Bernhard Schölkopf, editors, *Advances in Neural Information Processing Systems 16*, pages 281–288. MIT Press, December 2003.  
Acceptance rate: 27.6%.
18. Erez Perelman, **Greg Hamerly**, and Brad Calder. **Picking statistically valid and early simulation points.** In *12th International Conference on Parallel Architectures and Compilation Techniques (PACT 2003)*, pages 244–255. IEEE Computer Society, October 2003.  
Acceptance rate: 16.7%.
19. Erez Perelman, **Greg Hamerly**, Michael Van Biesbrouck, Tim Sherwood, and Brad Calder. **Using SimPoint for accurate and efficient simulation.** In *Proceedings of the international conference on measurement and modeling of computer systems (SIGMETRICS)*, pages 318–319, June 2003.
20. **Greg Hamerly** and Charles Elkan. **Alternatives to the  $k$ -means algorithm that find better clusterings.** In *Proceedings of the 2002 ACM CIKM International Conference on Information and Knowledge Management*, pages 600–607. ACM, November 2002.  
Acceptance rate: 25%.
21. Tim Sherwood, Erez Perelman, **Greg Hamerly**, and Brad Calder. **Automatically characterizing large scale program behavior.** In *Proceedings of the tenth international conference on architectural support for programming languages and operating systems (ASPLOS-X)*, pages 45–57, October 2002.  
Acceptance rate: 13.7%.
22. **Greg Hamerly** and Charles Elkan. **Bayesian approaches to failure prediction for disk drives.** In *Proceedings of the Eighteenth International Conference on Machine Learning (ICML 2001)*, pages 202–209. Morgan Kaufmann, June 2001.  
Acceptance rate: 32.1%.

## Invited publications

1. **Greg Hamerly**, Erez Perelman, and Brad Calder. **How to use SimPoint to pick simulation points.** *SIGMETRICS Performance Evaluation Review*, 31(4):25–30, March 2004.
2. Tim Sherwood, Erez Perelman, **Greg Hamerly**, Suleyman Sair, and Brad Calder. **Discovering and exploiting program phases.** *IEEE Micro: Micro’s top picks from computer architecture conferences*, 23(6):84–93, November 2003.  
**Impact factor:** 2.565 (ranked 9/45 in Hardware and Architecture).

## Invited book chapters

1. **Greg Hamerly**, Erez Perelman, Timothy Sherwood, and Brad Calder. **Representative sampling using SimPoint.** In *Processor and System-On-Chip Simulation*. Springer, 2010.
2. Brad Calder, Timothy Sherwood, **Greg Hamerly**, and Erez Perelman. **SimPoint: Picking representative samples to guide simulation.** In Lizy Kurian John and Lieven Eeckhout, editors, *Performance Evaluation and Benchmarking*, chapter 7. CRC Press, 2005.

## Doctoral dissertation

1. **Greg Hamerly.** *Learning structure and concepts in data through data clustering.* PhD thesis, University of California San Diego, June 2003.

## Invited presentations

- “Competitive Learning at Baylor University,” New Mexico Tech; CSE Speaker Series; February 1, 2013.
- “Hypothesis Testing and Model Selection for Clustering,” Texas A&M University; Parasol Seminar; December 5, 2008.
- “Improving SimPoint Accuracy for Small Simulation Budgets with EDCM Clustering,” University of Texas, Austin; Computer Science colloquium; April 30, 2008.
- “PG-means: learning the number of clusters in data,” University of Texas, Austin; Computer Science colloquium; May 4, 2007.

## Patents

- Method and apparatus for identifying similar regions of a program’s execution  
United States Patent 7,802,236

## Software packages developed and released

- Fast  $k$ -means (written in C++)

This software replicates Lloyd’s classical  $k$ -means algorithm, but is much faster (up to 40 times faster). It uses carefully-kept distance bounds (between points and centers) to reduce the number of distance calculations that are necessary. This algorithm enjoys a very small increase in required memory and is easily parallelized.

- SimPoint, versions 1.0 - 3.2 (written in C++)

This software is designed to efficiently identify the number of phase behaviors in the trace of a software program (or any vector-based event frequency trace), partition the trace into those phases, and select the most representative example(s) from each phase. Designed to deal with high-dimensional, sparse inputs. I developed this software for the 2002 ASPLOS publication, and have maintained it since then.

- G-means (written in Matlab)

An implementation of the G-means clustering algorithm that finds the number of clusters when using the  $k$ -means algorithm. Accompanies my 2003 NIPS publication.

- PG-means (written in Matlab and C++)

An implementation of the PG-means clustering algorithm that finds the number of clusters when using the Expectation-Maximization algorithm to train a mixture of Gaussians. Accompanies my 2006 NIPS publication.

## Students advised

Postdoctoral students:

- Pablo Rivas-Perea, Ph.D. 2012-2015.

Master's degrees supervised:

- Jan Sladek, 2017.
- Vaclav Cibur, 2016.
- James Boer, 2016.
- Petr Ryšavý, 2015.
- Ryan Yan, 2015.
- Ryan Henning, 2014.
- Paniz Karbasi, 2014.
- Li Guo, 2014.
- Jonathan Drake, 2013. Thesis topic: accelerated methods for the  $k$ -means algorithm.
- Tak-Chien Chiam, 2012. Thesis title: Age Classification from Facial Images for Detecting Retinoblastoma.
- Hao Guo, 2012. Project: Leukocoric Eye Detection in Digital Images
- George Montañez, Spring 2011 (Committee chairman; principally advised by Bob Marks). Thesis title: Information Storage Capacity of Genetic Algorithm Fitness Maps.
- Winston Ewert, Spring 2011 (Committee chairman; principally advised by Bob Marks). Thesis title: Studies of active information in search.
- Lei Meng, Summer 2010 (Co-advised with Greg Speegle). Topic: efficient cross-validation for  $k$ -nearest neighbor models using  $k$ d-trees.
- Bing Yin, Summer 2009. Thesis title: Hierarchical Stability-Based Model Selection For Clustering Algorithms
- Joshua Johnston, Spring 2007. Thesis title: Clustering in high dimension and choosing cluster representatives for SimPoint

- Yu Feng, Fall 2006. Thesis title: PG-means: Learning the Number of Clusters in Data

Outside committee member for the following students:

- Stephen Dark, M.S. in Electrical & Computer Engineering, November 2010.
- Chris Homan, M.S. in Computer Science, May 2009.
- Adam Sealey, M.S. in Computer Science, May 2009.
- Jason V. Davis, Ph.D. in Computer Science at University of Texas, Austin, April 2008.
- Ashish Arte, M.S. in Computer Science, November 2005.
- Lin Zhang, oral examination in Statistics, October 2005.
- Michael Coons, M.S. in Mathematics, May 2005.
- Jerry Knight, M.S. in Computer Science, April 2005.

Mentor for the following undergraduates:

- University Scholars thesis: Jonathan Drake, 2011.
- Honors thesis: Tak-Chien Chiam, 2009 - 2010.
- Honors directed reading: Tak-Chien Chiam, Spring 2009.
- Honors contract projects:
  - Chris Vaszauskas, CSI 3334, Fall 2009.
  - Mitchell Mebane, CSI 3334, Fall 2006.

## Grant activity

	RFP	Agency	Title	Date submitted	Amount requested	Years	Status
1	URC	Baylor	Learning to identify critical soliloquies in the Browning letters	Feb. 2013	\$6,000	1	Funded
2	Sabbatical	Baylor	Efficient algorithms for large-scale clustering	Oct. 2009	\$11,000	Summer	Funded
3	09-528	NSF	An interdisciplinary, problem-based, collaborative course on computational thinking	April 2009	\$156,277	2	Funded
4		ICPC	ICPC Competitive Learning Institute	Feb. 2009	\$2,000	1	Funded
5		JetPay	Baylor programming contest support	Aug. 2007	\$500	1	Funded
6		Intel	Accurate phase analysis for efficient simulation across multiple architectures	Feb. 2007	\$50,000	2	Funded
7	YIDP-06	Baylor	Improving SimPoint Functionality, Accuracy and Performance	June 2006	\$25,000	1	Funded

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	RFP	Agency	Title	Date submitted	Amount requested	Years	Status
8	-	BAEF	Postdoctoral research fellowship	Oct. 2003	\$17,000	1	Funded
9	-	JL Moore	Ph.D. fellowship	Sep. 1999	\$40,000	4	Funded
10	-	Powell	Ph.D. fellowship	Sep. 1999	\$15,000	1	Funded

## Honors and awards

- Baylor award for Outstanding Teaching (among tenured faculty from schools of Engineering and Computer Science, Business, and Law), 2012
- Two-time world finalist in the ACM International Programming Competition, 2000 and 2001

## Academic service

I have been a program committee member for the following conferences:

- IEEE International Symposium on Performance Analysis for Systems and Software (ISPASS), 2009
- ACM Knowledge Discovery in Databases (KDD), 2008
- ACM Conference on Information and Knowledge Management (CIKM), 2006-2008
- International Conference on Machine Learning, 2004

I have been a reviewer for the following conferences, journals, and organizations:

- National Science Foundation (NSF)
- Journal of Machine Learning Research (JMLR)
- International Conference on Machine Learning (ICML)
- Neural Information Processing Systems (NIPS)
- AAAI Conference
- International Symposium on High Performance Computing Architectures (HPCA)
- IEEE Transactions on Knowledge and Data Engineering (TKDE)
- IEEE Transactions on Parallel and Distributed Systems (TPDS)
- IEEE Transactions on Computers (TC)
- IEEE Transactions on Neural Networks (TNN)
- Journal of Intelligent and Fuzzy Systems (JIFS)
- International Conference on Very Large Data Bases (VLDB)
- International Conference on Discovery Science

I have been on the journal review board for:

- The International Journal of Artificial Intelligence, Neural Networks and Complex-Problem Solving Technologies

# Teaching experience

## Teaching activity

Courses taught at Baylor University:

- CSI 3334 Data Structures
- CSI 4144 Competitive Learning
- CSI 4330 Foundations of Computing
- CSI 4336 Theory of Computer Science
- CSI 5010 Graduate Seminar
- CSI 5325 Machine Learning

Courses taught at California Polytechnic State University, San Luis Obispo:

- CSc 101 Fundamentals of Computer Science I

Teaching assistant at University of California, San Diego:

- CSE 134A Web programming and databases
- CSE 130 Programming languages
- CSE 127 Computer security
- CSE 240 Graduate computer architecture