

# Dr. Michael Barnathan

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**Objective:** To utilize and refine my unique combination of interests, talents, and vision to perform significant purpose-driven work which changes the world for the better.

**Selected Interests:** Data Mining, Machine Learning, Computer Vision, Computer Assisted Diagnosis, Oncology, Education, Data Structures, World-Class Software Development, AI.

## Technical Knowledge

**Programming Languages:** Java, C++, Visual Basic, Perl, Matlab, R, C#, Protocol Buffers, Prolog, GOLOG.

**Web Development:** (X)HTML, CSS, JavaScript, SQL, Flash, XML, AJAX, JSP, Struts, jQuery.

**Development Tools:** Visual Studio 2010, Eclipse, Spring, Maven, Hadoop (**CCHD**), NetBeans, vi, svn, gdb.

**Database Systems:** MySQL, Hive, SQLite, Microsoft Access.

**System Administration:** "LAMP": Linux, Apache (>50 vhosts), MySQL, Perl, BIND, SSH, Postfix, Dovecot, amavisd, iptables, cron, syslogd, logrotate, Nagios, Cacti, etc.

**Operating Systems:** Windows (beta tester), Linux (Gentoo, Ubuntu, Fedora), Mac OS X, DOS.

**Productivity Software:** Microsoft Office, Dreamweaver, Photoshop, OpenOffice.

**Scientific Software:** Maple, Matlab, Maxima, R, LyX, LaTeX, BibTeX.

## Education

### Temple University Philadelphia, PA

**Aug. 2006 – May 2010** **Ph. D.** in Computer and Information Sciences. **GPA: 3.92**  
**Aug. 2006 – Aug. 2007** **Master of Science** in Computer and Information Sciences. **GPA: 3.89**

**Advisor:** Vasileios Megalooikonomou.  
**Thesis Topics:** Dissertation: Mining Complex High-Order Datasets, defended April 23, 2010.  
Master's Project: Medical Image Data Mining System, published at ISBI 2008.

**Fellowships:** Temple University Fellowship, CST Dean's Scholarship.

**Honor Societies:** Member of the Golden Key International Honor Society.

**Other Activities:** Member of the Temple University ACM and CIS Faculty Selection Committee.

### Monmouth University West Long Branch, NJ

**GPA: 3.96**

**Sep. 2002 – May 2006** **Bachelor of Science *Summa Cum Laude*** in Computer Science, Math minor.

**Awards:** **\$5,000 Academic Achievement Award for the Highest GPA in the Class of 2006, Computer Science Award (2006), Dean's List:** All semesters.

**Scholarships:** \$6,000/year Monmouth University Scholarship,  
Dr. Harold Jacobs Scholarship for Excellence in Sci., Tech., or Engineering (twice).

Honor Societies: Phi Eta Sigma, Lambda Sigma Tau, Kappa Mu Epsilon, Omicron Delta Kappa, National Dean's List (twice). Officer of Lambda Sigma Tau (2005-2006).  
Other Activities: President (2005-2006) and Vice President (2004-2005) of the MU ACM. Member of the School of Science Student/Alumni Advisory Council (2004-2009).

## Recent Employment Affiliations

**Sep. 13, 2010 – Present**      **Software Engineer**  
**Google**

Developed software in Java, C++, Shell, Python, and Protobuf with some of the world's most talented developers. Received peer bonuses in November 2010 (release heroism), February 2011 (superior code quality), July 2011 (enabled another team to meet a major quarterly goal), and September 2011 (independently added a real-time output feature from conception to implementation which sped two teams up by 500%), and a spot bonus in December 2011 (led a large three-team effort to timely completion, despite one team being hostile to the change). Committed 17,000 peer-reviewed lines of large, complex changes in C++ and Java across three projects in my first year, literally without introducing a single bug for over a year. Formulated a personal set of repeatable extreme software quality practices which I hope to implement across an entire organization in the future.

**June 23, 2010 – Sep. 10, 2010**      **Chief Software Developer**  
**(3 months)**      **Wixity**

Led both frontend and backend development of Wixity's event recommendation platform and website using Java, Tomcat, Struts, JSP, Hibernate, Spring, Tiles, MySQL, HTML, CSS, and JavaScript, including addition of new functionality and improvement of the entire existing codebase.

**Dec. 7, 2009 – July 30, 2010**      **Data Scientist**  
**(8 months)**      **Media6Degrees**

Applied machine learning, graph theory, and statistics to analyze and improve the company's sociographic targeting and conversion models, directly improving the advertiser's ability to accurately match users with relevant content. Resident expert in spectral graph theory and SVD recommendation. Designed graphical machine learning algorithms for classification, regression, clustering, KL, tf-idf, multidimensional scaling, and singular value decomposition using Java, Spring, Maven, Hadoop, Perl, R, and MySQL, serving as the link between data science and software development. Responsible for production implementation of feature computation.

**Sep. 9, 2008 – May 14, 2009**      **Adjunct Professor (of Computer Science)**  
**(8 months)**      **Monmouth University**

Taught CS305 and CS503, Monmouth University's undergraduate and graduate courses in data structures and algorithms in Java, during the Fall 2008 (CS503) and Spring 2009 ([CS305/503](#)) semesters.

**Aug 28, 2006 – May 13, 2010**      **Research Assistant and System Administrator**  
**(3 years, 8 months)**      **Data Engineering Laboratory, Temple University**

Conducted formal research to advance the fields of data mining and bioinformatics, especially computer-assisted diagnosis in mammography, MRI, and fMRI. Designed a novel CAD system capable of diagnosing breast cancer with 94% accuracy and brain tumors with 89% accuracy, created the first high-order medical image classification, clustering, and feature extraction algorithms, and developed from scratch the first publicly available implementation of WaveCluster. System administrator of the lab's Linux workstations and servers.

## Selected Publications

16 Total

**TWave: High-Order Analysis of Functional MRI:** By Michael Barnathan, et al. Accepted for publication in NeuroImage, 2011 (**Journal Paper**). Essence of my dissertation work. Treating density-based image clustering as a type of locality-sensitive latent semantic analysis, I derived the first high-order suite of powerful classification, clustering, and feature extraction techniques using wavelets (for locality), high-order singular value decomposition, and other tensor factorizations. My method is capable of co-clustering: drawing concurrent relationships between an arbitrary number of data modes and extracting insights from their interactions.

**A Representation and Classification Scheme for Tree-like Structures in Medical Images: Analyzing the Branching Pattern of Ductal Trees in X-ray Galactograms:** By V. Megalooikonomou, M. Barnathan, D. Kontos, P.R. Bakic, and A.D.A. Maidment. IEEE Transactions on Medical Imaging (2009), 28:4, 487-493. (**Journal paper**)

**A Texture-Based Methodology for Identifying Tissue Type in Magnetic Resonance Images:** By Michael Barnathan, et al. Published in Proceedings of the International Symposium on Biomedical Imaging (ISBI) 2008.

**A High-Level Language for Homeland Security Response Plans:** By Richard Scherl and Michael Barnathan. Published in Proceedings of the 2005 AAAI Spring Symposium on March 22, 2005.

## Relevant Personal Experience

**Dec. 2007 – Present**                      **Founding Director and Course Instructor, The Polymath Foundation**

Founded [an educational 501\(c\)\(3\) nonprofit](#) dedicated to establishing an interdisciplinary educational institution. Responsible for leading the organization, initial strategic planning, articulating the vision, designing the website, teaching web design and creativity [courses](#), and recruiting directors, instructors, students, and supporters.

**Sep. 1997 – Present**                      **Project Lead, Metasquarer**

Developed, hosted, and supported [Metasquarer](#), an online game, from the age of 12. Promoted the game to a peak population of approximately 10,000 users. Developed over 70 revisions of the game, currently 27,596 lines of code in size, while providing documentation and support. Created an O(n) algorithm to find squares within a grid and an AI opponent utilizing alpha-beta pruning from intuition years prior to learning the theory.

**Oct. 1994 – Present**                      **Web Developer and System Administrator**

Developed roughly 50 websites (see <http://barnathan.name> for a list) using XHTML, CSS, Perl, MySQL, JavaScript, and Flash. Installed a complete “LAMP” hosting environment on a self-administered dedicated server from scratch, including Gentoo Linux, BIND, Apache, MySQL, Perl, PHP, Postfix, Dovecot, iptables, and other services.

**January 2000**                              PlanetSourceCode Superior Coding Contest Winner (of ~50,900 coders, Age 15)

## Other Skills:

- Broad medical knowledge and a burning desire to make a significant contribution to medical treatment, coupled with existing pioneering medical research in structural and functional radiology.
- Proficient as a pianist and composer (including concert and music festival experience).
- Created electronic devices from a solar GPS to two Wi-Fi enabled, learning, stock-predicting crystal balls.
- Breadth of knowledge! Experience in photography, poetry, writing, philosophy, and game design.
- Extremely independent and self-motivated. Highly creative in a suitable environment.