

SALEEMA AMERSHI

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RESEARCH INTERESTS

I am a Researcher in the Machine Teaching Group at Microsoft Research. "Machine teaching" is machine learning with a focus on increasing user, or "teacher", productivity and effectiveness.

My research lies at the intersection of human-computer interaction and machine learning. In particular, I create tools to support both practitioner and end-user interaction with machine learning systems. Examples include general purpose tools to support data scientists and machine learning experts building reusable predictive models for production use and application specific tools to support the average person interacting with machine learning in their everyday lives (e.g., automation technologies and recommender systems). Throughout my work, I distill guiding principles applicable in a broader context to help provide a foundation for future human-driven machine learning systems.

<http://research.microsoft.com/~samershi>

EDUCATION

- 2007–2012 **Ph.D. Computer Science**
University of Washington, Seattle, WA
Advisor: Professor James Fogarty
Thesis: *Designing for Effective End-User Interaction with Machine Learning*
Winner of University of Washington's 2013 Distinguished Dissertation Award
- 2004-2006 **M.Sc. Computer Science**
University of British Columbia, Vancouver, BC
Advisor: Professor Cristina Conati
Thesis: *Combining Unsupervised and Supervised Machine Learning to Build User Models for Intelligent Learning Environments*
- 1999-2004 **B.Sc. Computer Science & Mathematics (Double Major)**
University of British Columbia, Vancouver, BC

HONORS AND AWARDS

- 2016 Invited to National Academy of Engineering, Frontiers of Engineering (US FOE)
- 2014 Best Paper Award Winner, CHI 2014
- 2013 Distinguished Dissertation Award, University of Washington 2013
- 2011 Invited Paper, IJCAI 2011, Invited as Best of CHI 2011
Best Paper Nominee, CHI 2011
Kumar & Roberta L. Bhasin Endowed Fellowship Recipient, Academic Fellowship
- 2010 Best Paper Nominee, CSCW 2010
Facebook Fellowship Finalist, Institutional Fellowship
Microsoft Research PhD Fellowship Finalist, Institutional Fellowship
- 2009 Google Anita Borg Scholarship Recipient, National Research Award
Best Paper Nominee, CHI 2009

2007 Microsoft Endowed Fellowship, Institutional Fellowship
2005 University Graduate Fellowship, Academic Fellowship
2003, 2004 NSERC Undergraduate Research Award, National Research Award

PROFESSIONAL EXPERIENCE

2012-
Present **Microsoft Research, Redmond, WA**
Machine Teaching Group
Researcher
[P.20-28], [D.5-6], [T.6-13]

2007–2012 **University of Washington, Seattle, WA**
Computer Science & Engineering Department
Graduate Research Assistant (Advisor: James Fogarty)
Investigated the design of effective end-user interaction with machine learning systems.
[P.16-18], [P.13], [P.10], [P.7-8], [D.4], [D.2], [W.4-5]

Fall 2011 **Google Research, Mountain View, CA**
Research Intern (Host: Ed H. Chi)
Explored end-user interactive machine learning in the context of online social networks.

Fall 2010 **IBM Research, Almaden, CA**
Research Intern (Hosts: Jalal Mahmud, Tessa Lau and Jeffrey Nichols)
Developed LiveAction, a machine learning-based approach to building personal Web task models.
[P.19], [T.5]

Summer
2010 **Microsoft Research, Redmond, WA**
Research Intern (Host: Bongshin Lee)
Created CueT, a novel interactive machine learning system for computer network alarm triage.
[P.17], [P.15], [T.4]

Summer
2008 **Microsoft Research, Bangalore, India**
Research Intern (Host: Kentaro Toyama)
Explored mouse-based text entry for single-display groupware used in underserved classrooms.
[P.11], [T.3]

Summer
2007 **Microsoft Research, Redmond, WA**
Research Intern (Host: Meredith Ringel Morris)
Created CoSearch, a tool for co-located collaborative Web search.
[P.6], [W.2-3], [D.3], [D.1], [T.2], [S.1-3]

2005-2006 **University of British Columbia, Vancouver, BC**
Laboratory for Computational Intelligence
Graduate Research Assistant (Advisor: Cristina Conati)
Developed a machine learning framework for user modeling in adaptive educational technologies.
[P.12], [P.9], [P.2-4], [W.1]

2003-2005 **University of British Columbia, Vancouver, BC**
Laboratory for Computational Intelligence
Undergraduate Research Assistant (Advisors: Alan Mackworth and David Poole)
Contributed to AIspace (www.aispace.org), tools for exploring Artificial Intelligence algorithms.
[P.5], [P.1]

TEACHING EXPERIENCE

- Spring 2007 **Advanced Topics in HCI (CSE 510)**
University of Washington, Computer Science & Engineering
Graduate Teaching Assistant for Professor James Fogarty
- Winter 2007 **Software Engineering (CSE 403)**
University of Washington, Computer Science & Engineering
Graduate Teaching Assistant for Marty Stepp
- 2001-2003 **Alma Mater Society (AMS) Tutoring Services**
University of British Columbia
Tutor (Math, Physics, Chemistry and English)
- Summer 2002 **Software Engineering (CSE 403)**
University of British Columbia, Computer Science
Undergraduate Teaching Assistant for Andrew Warfield

REFEREED ARTICLES

- [P.28] Chang, J. C., **Amershi, S.**, and Kamar, E. (2017) Revolt: Collaborative Crowdsourcing for Labeling Machine Learning Datasets. To Appear in the *Proceedings of the ACM Conference on Human Factors in Computing Systems (CHI 2017)*. (Acceptance rate: 25%)
- [P.27] Huang, T. K., Li, L., Vartanian, A., **Amershi, S.**, and Zhu, J. (2016) Active Learning with Oracle Epiphany. To Appear in the *Proceedings of Neural Information Processing Systems (NIPS 2016)*. (Acceptance rate: 23%)
- [P.26] Ren, D., **Amershi, S.**, Lee, B., Suh, J., and Williams, J. D. (2016) Squares: Supporting Interactive Performance Analysis for Multiclass Classifiers. *IEEE Transactions on Visualization and Computer Graphics (TVCG), Visual Analytics Science and Technology (VAST 2016)*. (Acceptance rate: 21%)
- [P.25] Toutanova, K., Brockett, C., Tran, K. M., and **Amershi, S.** (2016) A Dataset and Evaluation Metrics for Abstractive Sentence and Paragraph Compression. *Proceedings of the International Conference on Empirical Methods in Natural Language Processing (EMNLP 2016)*.
- [P.24] Suh, J., Zhu, J., and **Amershi, S.** (2016) The Label Complexity of Mixed-Initiative Classifier Training. *Proceedings of the International Conference on Machine Learning (ICML 2016)*. (Acceptance rate: 24%)
- [P.23] Brooks, M., **Amershi, S.**, Lee, B., Drucker, S., Kapoor, A., and Simard, P. (2015) FeatureInsight: Visual Support for Error-Driven Feature Ideation in Text Classification. *Proceedings of the IEEE Conference on Visual Analytics Science & Technology (VAST 2015)*.
- [P.22] **Amershi, S.**, Chickering, M., Drucker, S., Lee, B., Simard, P., and Suh, J. (2015) ModelTracker: Redesigning Performance Analysis Tools for Machine Learning. *Proceedings of the ACM Conference on Human Factors in Computing Systems (CHI 2015)*, pp.337-346. (Acceptance rate: 23%)
- [P.21] **Amershi, S.**, Cakmak, M., Knox, W.B., and Kulesza, T. (Winter 2014) Power to the People: The Role of Humans in Interactive Machine Learning. *AI Magazine* 35 (4) pp. 105-120.
- [P.20] Kulesza, T., **Amershi, S.**, Caruana, R., Fisher, D., and Charles, D. (2014) Structured Labeling to Facilitate Concept Evolution in Machine Learning. *Proceedings of the ACM Conference on Human Factors in Computing Systems (CHI 2014)*, pp. 3075-3084. (Acceptance rate: 23%)
Best Paper Winner

- [P.19] **Amershi, S.**, Mahmud, J., Nichols, J., Lau, T. and Ruiz, G.A. (2013) LiveAction: Automating Web Task Model Generation. *ACM Transactions on Interactive Intelligent Systems (TiiS)* 3 (3) pp. 14:1-14:23.
- [P.18] **Amershi, S.**, Fogarty, J. and Weld, D.S. (2012) ReGroup: Interactive Machine Learning for On-Demand Group Creation in Social Networks. *Proceedings of the ACM Conference on Human Factors in Computing Systems (CHI 2012)*, pp. 21-30. (Acceptance rate: 23%)
- [P.17] **Amershi, S.**, Lee, B., Kapoor, A., Mahajan, R. and Christian, B. (2011) Human-Guided Machine Learning for Fast and Accurate Network Alarm Triage. *Proceedings of the International Joint Conference on Artificial Intelligence (IJCAI 2011)*, Best Papers from Sister Conferences Track, pp. 2564-2569.
Invited Paper
- [P.16] **Amershi, S.**, Fogarty, J., Kapoor, A. and Tan, D. (2011) Effective End-User Interaction with Machine Learning. *Proceedings of the AAAI Conference on Artificial Intelligence (AAAI 2011)*, Nectar Track, pp. 1529-1532. (Acceptance rate: 31%)
- [P.15] **Amershi, S.**, Lee, B., Kapoor, A., Mahajan, R. and Christian, B. (2011) CueT: Human-Guided Fast and Accurate Network Alarm Triage. *Proceedings of the ACM Conference on Human Factors in Computing Systems (CHI 2011)*, pp. 157-166. (Acceptance rate: 25%)
Best Paper Nominee
- [P.14] Chen, J., **Amershi, S.**, Dhananjay, A. and Lakshmi, S. (2010) Comparing Web Interaction Models in Developing Regions. *Proceedings of the ACM Symposium on Computing for Development (DEV 2010)*. (Acceptance rate: 44%)
- [P.13] **Amershi, S.**, Fogarty, J., Kapoor, A. and Tan, D. (2010) Examining Multiple Potential Models in End-User Interactive Concept Learning. *Proceedings of the ACM Conference on Human Factors in Computing Systems (CHI 2010)*, pp. 1357-1360. (Acceptance rate: 22%)
- [P.12] **Amershi, S.** and Conati, C. (2010) Automatic Recognition of Learner Types in Exploratory Learning Environments. *Handbook of Educational Data Mining, Chapter 15*. Data Mining and Knowledge Discovery Series (eds. R. Cohen and V. Kumar), Chapman & Hall/CRC Press.
- [P.11] **Amershi, S.**, Morris, M. R., Moraveji, N., Balakrishnan, R., and Toyama, K. (2010) Multiple Mouse Text Entry for Single-Display Groupware. *Proceeding of the ACM Conference on Computer Supported Cooperative Work (CSCW 2010)*, pp. 169-178. (Acceptance rate: 20%)
Best Paper Nominee
- [P.10] **Amershi, S.**, Fogarty, J., Kapoor, A. and Tan, D. (2009) Overview-Based Examples Selection in Mixed-Initiative Interactive Concept Learning. *Proceeding of the ACM Symposium on User Interface Software and Technology (UIST 2009)*, pp. 247-256. (Acceptance rate: 17%)
- [P.9] **Amershi, S.** and Conati, C. (2009) Combining Unsupervised and Supervised Machine Learning to Build User Models for Exploratory Learning Environments. *The Journal of Educational Data Mining* 1, 2 (Fall 2009).
- [P.8] Hoffmann, R., **Amershi, S.**, Patel, K., Wu, F., Fogarty, J., and Weld, D.S. (2009) Amplifying Community Content Creation with Mixed-Initiative Information Extraction. *Proceedings of the ACM Conference on Human Factors in Computing Systems (CHI 2009)*, pp. 1849-1858. (Acceptance rate: 24%)
Best Paper Nominee
- [P.7] Weld, D.S., Wu, F., Adar, E., **Amershi, S.**, Fogarty, J., Hoffmann, R., Patel, K., and Skinner, M. (2008) Intelligence in Wikipedia. *Proceedings of the AAAI Conference on Artificial Intelligence (AAAI 08)*, Senior Papers Track, pp. 1609-1614. (Acceptance rate: 40%)
- [P.6] **Amershi, S.** and Morris, M.R. (2008) CoSearch: A System for Co-located Collaborative Web Search. *Proceedings of the ACM Conference on Human Factors in Computing Systems (CHI 2008)*, pp. 1647-1656. (Acceptance rate: 22%)

- [P.5] **Amershi, S.**, Carenini, G., Conati, C., Mackworth, A., and Poole, D. (2008) Pedagogy and Usability in Interactive Algorithm Visualizations - Designing and Evaluating CIspace. *Interacting with Computers - The Interdisciplinary Journal of Human-Computer Interaction* 20 (1): pp. 64-96.
- [P.4] Conati, C., Merten, C., **Amershi, S.**, and Muldner, K. (2007) Using Eye-tracking Data for High-Level User Modeling in Adaptive Interfaces. *Proceedings of the AAAI Conference on Artificial Intelligence (AAAI 07)*, Nectar Track pp. 1614-1617. (Acceptance rate: 17%)
- [P.3] **Amershi, S.** and Conati, C. (2007) Unsupervised and Supervised Machine Learning in User Modeling for Intelligent Learning Environments. *Proceedings of the ACM/SIGCHI Conference on Intelligent User Interfaces (IUI 2007)*, pp. 72-81. (Acceptance rate: 22%)
- [P.2] **Amershi, S.** and Conati, C. (2006) Automatic Recognition of Learner Groups in Exploratory Learning Environments. *Proceedings of Intelligent Tutoring Systems (ITS 2006)*, pp. 463-472. (Acceptance rate: 32%)
- [P.1] **Amershi, S.**, Arksey, N., Carenini, G., Conati, C., Mackworth, A., Maclaren, H., and Poole, D. (2005) Designing CIspace: Pedagogy and Usability in a Learning Environment for AI. *Proceedings of the ACM/SIGCSE Conference on Innovation and Technology in Computer Science Education (ITiCSE 2005)*, pp. 178-182. (Acceptance rate: 33%)

REFEREED WORKSHOP PAPERS

- [W.5] **Amershi, S.** and Fogarty, J. (2012) Designing for Effective End-User Interactive Machine Learning. *The ACM Conference on Human Factors in Computing Systems Workshop on End-User Interactions with Intelligent and Autonomous Systems (CHI 2012)*.
- [W.4] **Amershi, S.** (2011) Designing for Effective End-User Interaction with Machine Learning. *The ACM Symposium on User Interface Software and Technology Doctoral Symposium (UIST 2011)*.
- [W.3] **Amershi, S.** and Morris, M.R. (2008) CoSearch: Leveraging Multiple Devices to Enhance Collaboration in Resource-Constrained Environments. *The ACM Conference on Human Factors in Computing Systems Workshop on HCI for Community and International Development (CHI 2008)*.
- [W.2] Morris, M.R. and **Amershi, S.** (2008) Shared Sensemaking: Enhancing the Value of Collaborative Web Search Tools. *The ACM Conference on Human Factors in Computing Systems Workshop on Sensemaking (CHI 2008)*.
- [W.1] **Amershi, S.**, Conati, C. and Maclaren, H. (2006) Using Feature Selection and Unsupervised Clustering to Identify Affective Expressions in Educational Games. In *Proceedings of The Intelligent Tutoring Systems Workshop on Motivational and Affective Issues (ITS 2006)*, pp. 21-28.

TECHNICAL REPORTS, REFEREED DEMOS, AND REFEREED POSTERS

- [D.6] Simard, P., Chickering, M., Lakshmiratan, A., Garcia Jurado Suarez, C., **Amershi, S.**, Verwey, J., and Suh, J. (2014) ICE: Interactive Classification and Entity Extraction. *Neural Information Processing Systems Demonstrations (NIPS 2014)*.
- [D.5] Simard, P., Chickering, M., Lakshmiratan, A., Charles, D., Bottou, L., Garcia Jurado Suarez, C., Grangier, D., **Amershi, S.**, Verwey, J., and Suh, J. (2014) ICE: Enabling Non-Experts to Build Models Interactively for Large-Scale Lopsided Problems. arXiv:1409.4814 [cs.AI], Microsoft Research 2014.

- [D.4] **Amershi, S.**, Fogarty, J., Kapoor, A., and Tan, D. (2009) Designing for End-User Interactive Concept Learning in CueFlik. *Workshop on Analysis and Design of Algorithms for Interactive Machine Learning at NIPS 2009 (ADA-IML at NIPS 2009)*.
- [D.3] **Amershi, S.** and Morris, M.R. (2009) Co-located Collaborative Web Search: Understanding Status Quo Practices. *Human Factors in Computing Systems – Extended Abstracts (CHI 2009)*.
- [D.2] Hoffmann, R., **Amershi, S.**, Patel, K., Wu, F., Fogarty, J., and Weld, D.S. (2008) Amplifying Community Content Creation with Mixed-Initiative Information Extraction. *The ACM Symposium on User Interface Software and Technology (UIST 2008)*.
- [D.1] **Amershi, S.**, Morris, M.R. (2009) CoSearch: A System for Co-located Collaborative Web Search. *Microsoft Research’s TechFest (TechFest 2008)*.

PATENTS

- [T.13] **Amershi, S.**, Ren, D., Lee, B., Suh, J., and Williams, J. (2016) Interactive Performance Visualization of Multi-Class Classifiers. Pending.
- [T.12] Teevan, J., Iqbal, S., Liebling, D., Choudhury, P., Paradiso, A., Gehring, D., Gruen, R., Carbary, T., Kamar, E., **Amershi, S.**, Toutanova, K. (2016) Providing Rewards and Metrics for Completion of Microtasks. Pending.
- [T.11] **Amershi, S.**, Brooks, M., Drucker, S., Lee, B., Simard, P., Suh, J., and Kapoor, A. (2014) Error-Driven Feature Ideation in Machine Learning. Pending.
- [T.10] **Amershi, S.**, Drucker, S., Lee, B., Simard, P., Lakshmiratan, A., Suarez, C.G.J., Charles, D., Grangier, D., and Chickering, M. (2013) Interactive Visualization of Machine-Learning Performance. Pending.
- [T.9] **Amershi, S.**, Kulesza, T., Caruana, R., Charles, D., and Fisher, D. (2013) Structured Labeling to Facilitate Concept Evolution in Machine Learning. Pending.
- [T.8] Simard, P., Chickering, M., Bottou, L., Charles, D., Lakshmiratan, A., Suarez, C.G.J., Grangier, D., and **Amershi, S.** (2013) Interactive Segment Extraction in Computer-Human Interactive Learning. Pending.
- [T.7] Simard, P., Grangier, D., Chickering, M., and **Amershi, S.** (2013) Active Featuring in Computer-Human Interactive Learning. Pending.
- [T.6] Simard, P., Grangier, D., Bottou, L., **Amershi, S.**, and Lakshmiratan, A. (2013) Interactive Concept Editing in Computer-Human Interactive Learning. Pending.
- [T.5] **Amershi, S.**, Lau, T.A., Mahmud, J.U., and Nichols, J.W. (2011) Automated Web Task Procedures Based on an Analysis of Actions in Web Browsing History Logs. Pending.
- [T.4] Lee, B., Kapoor, A., Mahajan, R., Christian, B., and **Amershi, S.** (2011) Interactive Machine Learning for Stream-Based Data Triage. U.S. Patent Number 9122995.
- [T.3] Morris, M.R., **Amershi, S.**, Moraveji, N., and Balakrishnan, R. (2009) Multiple Mouse Character Entry. Pending.
- [T.2] **Amershi, S.** and Morris, M.R. (2009) System and Interface for Co-located Collaborative Web Search. U.S. Patent Number 8266139.
- [T.1] Morris, M.R., Teevan, J., **Amershi, S.**, and Mickens, J. (2008) Using Related Users’ Data to Enhance Web Search. U.S. Patent Number 8244721.

SELECTED PRESS

- [S.3] Searching as a Team. *MIT Technology Review*, March 2008.
<http://www.technologyreview.com/Infotech/20405/?nlid=936&a=f>
- [S.2] Microsoft Research Shows New Search Projects. *Seattle Post-Intelligencer*, March 2008.
<http://blog.seattlepi.nwsource.com/microsoft/archives/133413.asp>
- [S.1] Microsoft Shows Off Collaborative Search Tools. *InfoWorld*, March 2008.
http://www.infoworld.com/article/08/03/04/Microsoft-shows-off-collaborative-search-tools_1.html

INVITED TALKS

- Dec. 2016 *Better Machine Learning Through Data*, NIPS 2016 Workshop on Interpretable Machine Learning for Complex Systems
- Aug. 2016 *Better Machine Learning Through Data*, KDD 2016 Workshop on Interactive Data Exploration and Analytics (IDEA) Keynote
- Feb. 2015 *Towards Usable Machine Learning*, Stanford University
- Feb. 2015 *Towards Usable Machine Learning*, University of Washington
- Feb. 2015 *Towards Usable Machine Learning*, University of Rochester (Remote)
- Oct. 2013 *Designing for Effective End-User Interaction with Machine Learning*, MIT
- April 2012 *Designing for Effective End-User Interaction with Machine Learning*, Adobe Systems
- April 2012 *Designing for Effective End-User Interaction with Machine Learning*, IBM Research Almaden
- March 2012 *Designing for Effective End-User Interaction with Machine Learning*, Google Research
- March 2012 *Designing for Effective End-User Interaction with Machine Learning*, Microsoft Research
- July 2011 *Designing for Effective End-User Interaction with Machine Learning*, FX Palo Alto Laboratory

RESEARCH ADVISEES AND INTERNS

- 2016 Joseph Chee Chang (Carnegie Mellon University, *MSR Intern*)
- 2016 William McGrath (Stanford University, *MSR Intern*)
- 2016 Donghao Ren (University of California, Santa Barbara, *MSR Intern*)
- 2016 Patricia Popp (*MSR Highschool Intern*)
- 2016 Zoe Lawrence (*MSR Highschool Intern*)
- 2015 Donghao Ren (University of California, Santa Barbara, *MSR Intern*)
- 2015 Biye Jiang (University of California, Berkeley, *MSR Intern*)
- 2015 Jian Zhao (University of Toronto, *MSR Intern*)
- 2014 Michael Brooks (University of Washington, *MSR Intern*)
- 2014 Beom-Seok Oh (Yonsei University, *MSR Intern*)
- 2013 Todd Kulesza (Oregon State University, *MSR Intern*)

PROFESSIONAL SERVICE

Organizing Committee	CHI 2016 Workshop on Human-Centered Machine Learning, Co-Organizer IUI 2013 Workshop on Interactive Machine Learning, Organizer CHI 2011, Assistant to General Chair UIST 2009, Student Volunteer Co-Chair
Program Committee	CHI 2016 CHI 2016 Workshop on Human-Centered Machine Learning KDD 2013-2016 Workshop on Interactive Data Exploration and Analytics (IDEA) IUI 2013-2015 CHI 2013-2015 Works in Progress UIST 2014 Grace Hopper 2013 CHI 2012 Workshop on End-User Interactions with Intelligent Systems UIST 2010-2011 (Poster Committee) AAAI 2010 Symposium on Artificial Intelligence for Development
Reviewer	CHI 2008-2015, 2017 ACM TiiS 2011, 2015, 2017 IEEE TVCG 2016 UIST 2008, 2010, 2012-2015, 2016 UbiComp 2011-2014, 2016 IEEE VAST 2016 NSF Review Panel 2015 UbiComp 2011-2014 MobileHCI 2012 EuroVis 2012 ACM Transactions on the Web 2012 IEEE Pervasive Computing 2009 – Special Issue on Smarter Phones Pervasive 2009 EDM Handbook 2009
Student Volunteer	IJCAI 2009 Workshop on Intelligence and Interaction UIST 2008
University Service	DUB Student Coordinator, 2008-2009 UW CSE Student Life Survey Coordinator, 2008-2009 UW CSE Prospective Student Committee Member, 2008
Outreach Service	Founder of Women’s Meeting Group, MSR India, Bangalore, India, 2008 Women in Technology Speaker, Women in Leadership (WIL) Foundation, Vancouver, BC, 2005 Remedial High School Science Teacher, The Learning Center, Burnaby, BC, 2001-2002

REFERENCES

James Fogarty

Associate Professor
Computer Science & Engineering,
University of Washington
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Thomas J. Cable/WRF Professor
Computer Science & Engineering,
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Principal Researcher and Manager
Computational User Experiences Group,
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Ashish Kapoor

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