Stanford



Moses Charikar

Donald E. Knuth Professor and Professor, by courtesy, of Mathematics

Computer Science

Curriculum Vitae available Online

Bio

BIO

Moses Charikar is the Donald E. Knuth professor of Computer Science at Stanford University. He obtained his PhD from Stanford in 2000, spent a year in the research group at Google, and was on the faculty at Princeton from 2001-2015.

His research interests include: computational problems in high-dimensional statistics and optimization problems in machine learning; computational social choice; approximation algorithms for discrete optimization problems; efficient algorithms for processing massive high-dimensional data sets; low-distortion embeddings of finite metric spaces.

His work won best paper awards at FOCS 2003, COLT 2017 and SODA 2024, the 10 year best paper award at VLDB 2017 and the 20 year test of time award at STOC 2022. He was jointly awarded the 2012 Paris Kanellakis Theory and Practice Award for his work on locality sensitive hashing, was named a Simons Investigator in theoretical computer science in 2014, and an ACM Fellow in 2021.

ACADEMIC APPOINTMENTS

- Professor, Computer Science
- Professor (By courtesy), Mathematics
- Member, Bio-X
- Member, Wu Tsai Human Performance Alliance

HONORS AND AWARDS

- ACM Fellow, ACM (2021)
- Paris Kanellakis Theory and Practice Award, ACM (2012)
- Simons Investigator in Theoretical Computer Science, Simons Foundation (2014)
- Alfred P. Sloan Fellowship, Sloan Foundation (2003)
- Distinguished Alumnus Award, IIT Bombay (2016)
- 20 year test of time award, STOC (2022)
- 10 year best paper award, VLDB (2017)
- Best paper award, COLT (2017)
- Best paper award, FOCS (2003)

BOARDS, ADVISORY COMMITTEES, PROFESSIONAL ORGANIZATIONS

- Sloan Research Fellowships Selection Committee Member, Alfred P. Sloan Foundation (2022 - present)
- Godel Prize Committee, ACM SIGACT (2015 - 2018)
- Scientific Advisory Board Member, Simons Institute for the Theory of Computing (2015 - 2018)
- Director, Center for Computational Intractability (2012 - 2014)
- Member, SIGACT Committee for the Advancement of Theoretical Computer Science (2011 - 2017)
- Member, ACM-SIAM SODA steering committee (2010 - 2012)

PROFESSIONAL EDUCATION

- B.Tech., Indian Institute of Technology, Bombay , Computer Science and Engineering (1995)
- Ph.D., Stanford University , Computer Science (2000)

PATENTS

- Moses Charikar, Deepa Ramakrishna. "United States Patent 10,282,863 Lossless Compression of Fragmented Image Data", EMC Corporation, May 7, 2019
- Moses Charikar, Deepa Ramakrishna. "United States Patent 10,249,059 Lossless Compression of Fragmented Image Data", EMC Corporation, Apr 2, 2019
- Moses Charikar, Deepa Ramakrishna. "United States Patent 10,114,839 Format Identification for Fragmented Data", EMC Corporation, Oct 30, 2018
- Moses Charikar, Deepa Ramakrishna. "United States Patent 9,684,974 Lossless compression of fragmented image data", EMC Corporation, Jun 20, 2017
- Moses Charikar, Deepa Ramakrishna. "United States Patent 9,558,566 Lossless compression of fragmented image data", EMC Corporation, Jan 31, 2017
- Moses Charikar, Deepa Ramakrishna. "United States Patent 9,495,390 Format identification for fragmented image data", EMC Corporation, Nov 15, 2016
- Moses Charikar, Deepa Ramakrishna. "United States Patent 9,384,218 Format identification for fragmented image data", EMC Corporation, Jul 5, 2016
- Kai Li, Qin, Lv, Moses Charikar. "United States Patent 7966327B2 Similarity search system with compact data structures", The Trustees Of Princeton University, Jun 21, 2011
- Ran Canetti, Moses Charikar, Sridhar Rajagopalan, S. Ravikumar, Amit Sahai, Andrew Tomkins. "United States Patent US7222362B1 Non-transferable anonymous credentials", IBM, May 22, 2007
- Moses Charikar. "United States Patent US7158961 B1 Methods and apparatus for estimating similarity", Google, Inc, Dec 31, 2001

LINKS

- Google Scholar page: https://scholar.google.com/citations?user=zX3ba1kAAAAJ&hl=en
- DBLP page: https://dblp.uni-trier.de/pers/hd/c/Charikar:Moses
- Semantic Scholar page: https://www.semanticscholar.org/author/Moses-Charikar/1745732?sort=velocity

Research & Scholarship

CURRENT RESEARCH AND SCHOLARLY INTERESTS

Efficient algorithmic techniques for processing, searching and indexing massive high-dimensional data sets; efficient algorithms for computational problems in high-dimensional statistics and optimization problems in machine learning; approximation algorithms for discrete optimization problems with provable guarantees; convex optimization approaches for non-convex combinatorial optimization problems; low-distortion embeddings of finite metric spaces.

Teaching

COURSES

2025-26

- Artificial Intelligence: Principles and Techniques: CS 221 (Spr)
- Design and Analysis of Algorithms: CS 161 (Win)
- Machine Learning: CS 229, STATS 229 (Aut)

2024-25

- Artificial Intelligence: Principles and Techniques: CS 221 (Spr)
- Design and Analysis of Algorithms: CS 161 (Win)
- Machine Learning: CS 229, STATS 229 (Aut)

2023-24

- Artificial Intelligence: Principles and Techniques: CS 221 (Spr)
- Design and Analysis of Algorithms: CS 161 (Win)
- Machine Learning: CS 229, STATS 229 (Aut)

STANFORD ADVISEES

Doctoral Dissertation Reader (AC)

Jiale Chen, Spencer Compton, Saminul Haque, Charlotte Peale

Doctoral Dissertation Co-Advisor (AC)

Ruiquan Gao, Alireza Haqi, Anna Thomas

Master's Program Advisor

Ayaan Malik, Steve Mendeleev, Ishani Mukherjee, Ava Parekh

Doctoral (Program)

Chirag Pabbaraju, Aidan Perreault

Publications

PUBLICATIONS

- **An Improved Greedy Approximation for (Metric) k-Means**
  Charikar, M., Cohen-Addad, V., Gao, R., Grandoni, F., Lee, E., Van Wijland, E., IEEE COMPUTER SOC
  IEEE COMPUTER SOC.2025: 233-240
- **Correlation Clustering Beyond the Pivot Algorithm**
  Behnezhad, S., Charikar, M., Cohen-Addad, V., Ghafari, A., Ma, W.
  edited by Singh, A., Fazel, M., Hsu, D., Lacoste-Julien, S., Berkenkamp, F., Maharaj, T., Wagstaff, K., Zhu, J.
  JMLR-JOURNAL MACHINE LEARNING RESEARCH.2025
- **Exploring Facets of Language Generation in the Limit**
  Charikar, M., Pabbaraju, C.
  edited by Haghtalab, N., Moitra, A.
  JMLR-JOURNAL MACHINE LEARNING RESEARCH.2025
- **Six Candidates Suffice to Win a Voter Majority**
  Charikar, M., Lassota, A., Ramakrishnan, P., Vetta, A., Wang, K.

edited by Koucky, M., Bansal, N.
ASSOC COMPUTING MACHINERY.2025: 1590-1601

- **Breaking the Metric Voting Distortion Barrier** *JOURNAL OF THE ACM*
  Charikar, M., Ramakrishnan, P., Wang, K., Wu, H.
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- **Improved Approximations for Ultrametric Violation Distance**
  Charikar, M., Gao, R.
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- **Quantifying the Gain in Weak-to-Strong Generalization**
  Charikar, M., Pabbaraju, C., Shiragur, K.
  edited by Globerson, A., Mackey, L., Belgrave, D., Fan, A., Paquet, U., Tomczak, J., Zhang, C.
  NEURAL INFORMATION PROCESSING SYSTEMS (NIPS).2024

- **A Quasi-Monte Carlo Data Structure for Smooth Kernel Evaluations**
  Charikar, M., Kapralov, M., Waingarten, E.
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  SIAM.2024: 5118-5144

- **Distributed algorithms from arboreal ants for the shortest path problem.** *Proceedings of the National Academy of Sciences of the United States of America*
  Garg, S., Shiragur, K., Gordon, D. M., Charikar, M.
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- **A Characterization of List Learnability**
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- **Fast Algorithms for a New Relaxation of Optimal Transport**
  Charikar, M., Chen, B., Re, C., Waingarten, E.
  edited by Neu, G., Rosasco, L.
  JMLR-JOURNAL MACHINE LEARNING RESEARCH.2023

- **Single-Pass Streaming Algorithms for Correlation Clustering**
  Behnezhad, S., Charikar, M., Ma, W., Tan, L.
  edited by Bansal, N., Nagarajan
  SIAM.2023: 819-849

- **Simple, Scalable and Effective Clustering via One-Dimensional Projections**
  Charikar, M., Henzinger, M., Hu, L., Voetsch, M., Waingarten, E.
  edited by Oh, A., Neumann, T., Globerson, A., Saenko, K., Hardt, M., Levine, S.
  NEURAL INFORMATION PROCESSING SYSTEMS (NIPS).2023

- **p Local Density Estimation in High Dimensions** *MATHEMATICS OF OPERATIONS RESEARCH*
  Wu, X., Charikar, M., Natchu, V.
  2022

- **Multiway Online Correlated Selection**
  Blanc, G., Charikar, M., IEEE COMP SOC
  IEEE COMPUTER SOC.2022: 1277-1284

- **Polylogarithmic Sketches for Clustering**
  Charikar, M., Waingarten, E.
  edited by Bojanczyk, M., Merelli, E., Woodruff, D. P.
  SCHLOSS DAGSTUHL, LEIBNIZ CENTER INFORMATICS.2022

- **Metric Distortion Bounds for Randomized Social Choice**
  Charikar, M., Ramakrishnan, P.
  edited by Naor, J., Buchbinder, N.
  SIAM.2022: 2986-3004
- **Near-Optimal Explainable k-Means for All Dimensions**
  Charikar, M., Hu, L.
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  SIAM.2022: 2580-2606
- **On the Efficient Implementation of High Accuracy Optimality of Profile Maximum Likelihood**
  Charikar, M., Jiang, Z., Shiragur, K., Sidford, A.
  edited by Koyejo, S., Mohamed, S., Agarwal, A., Belgrave, D., Cho, K., Oh, A.
  NEURAL INFORMATION PROCESSING SYSTEMS (NIPS).2022
- **Almost 3-Approximate Correlation Clustering in Constant Rounds**
  Behnezhad, S., Charikar, M., Ma, W., Tan, L., IEEE Comp Soc
  IEEE COMPUTER SOC.2022: 720-731
- **Approximation Algorithms for Orthogonal Non-negative Matrix Factorization**
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- **A Model for Ant Trail Formation and its Convergence Properties**
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- **The Bethe and Sinkhorn Permanents of Low Rank Matrices and Implications for Profile Maximum Likelihood**
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- **Improved Algorithms for Edge Colouring in the W-Streaming Model**
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  SIAM.2021: 181-183
- **Improved Algorithms for Edge Colouring in the W-Streaming Model**
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- **Brief Announcement: A Randomness-efficient Massively Parallel Algorithm for Connectivity**
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- **CoopStore: Optimizing Precomputed Summaries for Aggregation** *PROCEEDINGS OF THE VLDB ENDOWMENT*
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- **Retrieving Top Weighted Triangles in Graphs**
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  ASSOC COMPUTING MACHINERY.2020: 295–303
- **Adaptive Discrete Phase Retrieval**
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- **Instance Based Approximations to Profile Maximum Likelihood**
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  edited by Larochelle, H., Ranzato, M., Hadsell, R., Balcan, M. F., Lin, H.
  NEURAL INFORMATION PROCESSING SYSTEMS (NIPS).2020
- **Institutions Share Successes, Failures, and Advice in Moving the Diversity Needle**
  Garcia, D., Charikar, M., Hearn, E., Lazowska, E., Reynolds, J., ASSOC COMP MACHINERY
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- **Unconditional Lower Bounds for Adaptive Massively Parallel Computation**
  Charikar, M., Ma, W., Tan, L., ACM
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- **Kernel Density Estimation through Density Constrained Near Neighbor Search**
  Charikar, M., Kapralov, M., Nouri, N., Siminelakis, P., IEEE
  IEEE.2020: 172-183
- **A General Framework for Symmetric Property Estimation**
  Charikar, M., Shiragur, K., Sidford, A.
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- **The One-Way Communication Complexity of Dynamic Time Warping Distance**
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- **Hierarchical Clustering better than Average-Linkage**
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- **Multi-commodity Flow with In-Network Processing**
  Charikar, M., Naamad, Y., Rexford, J., Zou, X.
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- **Rehashing Kernel Evaluation in High Dimensions**
  Siminelakis, P., Rong, K., Bailis, P., Charikar, M., Levis, P.
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- **Sampling Methods for Counting Temporal Motifs**
  Liu, P., Benson, A. R., Charikar, M., ACM
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  Charikar, M., Shiragur, K., Sidford, A.
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  IEEE COMPUTER SOC.2019: 769–92
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  Charikar, M., Chatziafratis, V., Niazadeh, R., Yaroslavtsev, G.
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MICROTOME PUBLISHING.2019

- **Recovery Guarantees For Quadratic Tensors With Sparse Observations**
  Zhang, H., Sharan, V., Charikar, M., Liang, Y.
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  MICROTOME PUBLISHING.2019

- **Efficient Density Evaluation for Smooth Kernels**
  Backurs, A., Charikar, M., Indyk, P., Siminelakis, P.
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  IEEE COMPUTER SOC.2018: 615–26

- **Resilience: A Criterion for Learning in the Presence of Arbitrary Outliers**
  Steinhardt, J., Charikar, M., Valiant, G.
  edited by Karlin, A. R.
  SCHLOSS DAGSTUHL, LEIBNIZ CENTER INFORMATICS.2018

- **Hierarchical Clustering with Structural Constraints**
  Chatziafratis, V., Niazadeh, R., Charikar, M.
  edited by Dy, J., Krause, A.
  JMLR-JOURNAL MACHINE LEARNING RESEARCH.2018

- **Local Density Estimation in High Dimensions**
  Wu, X., Charikar, M., Natchu, V.
  edited by Dy, J., Krause, A.
  JMLR-JOURNAL MACHINE LEARNING RESEARCH.2018

- **Hashing-Based-Estimators for Kernel Density in High Dimensions**
  Charikar, M., Siminelakis, P., IEEE
  IEEE.2017: 1032–43

- **Approximate Hierarchical Clustering via Sparsest Cut and Spreading Metrics**
  Charikar, M., Chatziafratis, V., ACM
  ASSOC COMPUTING MACHINERY.2017: 841–54

- **Local Guarantees in Graph Cuts and Clustering**
  Charikar, M., Gupta, N., Schwartz, R.
  edited by Eisenbrand, F., Koenemann, J.
  SPRINGER INTERNATIONAL PUBLISHING AG.2017: 136–47

- **Approximate Hierarchical Clustering via Sparsest Cut and Spreading Metrics**
  Charikar, M., Chatziafratis, V., ACM
  ASSOC COMPUTING MACHINERY.2017: 841–54

- **Local Guarantees in Graph Cuts and Clustering**
  Charikar, M., Gupta, N., Schwartz, R.
  edited by Eisenbrand, F., Koenemann, J.
  SPRINGER INTERNATIONAL PUBLISHING AG.2017: 136–47

- **Avoiding Imposters and Delinquents: Adversarial Crowdsourcing and Peer Prediction**
  Steinhardt, J., Valiant, G., Charikar, M.
  edited by Lee, D. D., Sugiyama, M., Luxburg, U. V., Guyon, Garnett, R.
  NEURAL INFORMATION PROCESSING SYSTEMS (NIPS).2016

- **On Approximating Target Set Selection**
  Charikar, M., Naamad, Y., Wirth, A.
  edited by Jansen, K., Mathieu, C., Rolim, J. D., Umans, C.
  SCHLOSS DAGSTUHL, LEIBNIZ CENTER INFORMATICS.2016

- **Top-k Frequent Item Maintenance over Streams** *DATA STREAM MANAGEMENT: PROCESSING HIGH-SPEED DATA STREAMS*
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  2016: 103–19
- **Spectral Embedding of k-Cliques, Graph Partitioning and k-Means**
  Awasthi, P., Charikar, M., Krishnaswamy, R., Sinop, A., ACM
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- **Targeted exploration and analysis of large cross-platform human transcriptomic compendia** *NATURE METHODS*
  Zhu, Q., Wong, A. K., Krishnan, A., Aure, M. R., Tadych, A., Zhang, R., Corney, D. C., Greene, C. S., Bongo, L. A., Kristensen, V. N., Charikar, M., Li, K., Troyanskaya, et al
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- **Relax, No Need to Round: Integrality of Clustering Formulations**
  Awasthi, P., Bandeira, A. S., Charikar, M., Krishnaswamy, R., Villar, S., Ward, R., ACM
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- **Smoothed Analysis of Tensor Decompositions**
  Bhaskara, A., Charikar, M., Moitra, A., Vijayaraghavan, A., Assoc Comp Machinery
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- **Online Bipartite Matching with Decomposable Weights**
  Charikar, M., Henzinger, M., Nguyen, H. L.
  edited by Schulz, A. S., Wagner, D.
  SPRINGER-VERLAG BERLIN.2014: 260–71
- **A Dependent LP-Rounding Approach for the k-Median Problem**
  Charikar, M., Li, S.
  edited by Czumaj, A., Mehlhorn, K., Pitts, A., Wattenhofer, R.
  SPRINGER-VERLAG BERLIN.2012: 194–205
- **On Quadratic Programming with a Ratio Objective**
  Bhaskara, A., Charikar, M., Manokaran, R., Vijayaraghavan, A.
  edited by Czumaj, A., Mehlhorn, K., Pitts, A., Wattenhofer, R.
  SPRINGER-VERLAG BERLIN.2012: 109–20
- **Improved Approximation Algorithms for Label Cover Problems** *ALGORITHMICA*
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  2011; 61 (1): 190-206
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  Guruswami, V., Hastad, J., Manokaran, R., Raghavendra, P., Charikar, M.
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- **Tight Hardness Results for Minimizing Discrepancy**
  Charikar, M., Newman, A., Nikolov, A., SIAM, ACM
  SIAM.2011: 1607–14
- **Near Linear Lower Bound for Dimension Reduction in l(1)**
  Andoni, A., Charikar, M. S., Neiman, O., Nguyen, H. L.
  edited by Ostrovsky, R.
  IEEE COMPUTER SOC.2011: 315–23
- **FITTING TREE METRICS: HIERARCHICAL CLUSTERING AND PHYLOGENY** *SIAM JOURNAL ON COMPUTING*
  Ailon, N., Charikar, M.
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- **l(2)(2) Spreading Metrics for Vertex Ordering Problems** *ALGORITHMICA*
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  Charikar, M., Makarychev, K., Makarychev, Y.
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- **Detecting High Log-Densities - an O(n(1/4)) Approximation for Densest k-Subgraph**
  Bhaskara, A., Charikar, M., Chlamtac, E., Feige, U., Vijayaraghavan, A., ACM
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- **Near-Optimal Algorithms for Maximum Constraint Satisfaction Problems** *ACM TRANSACTIONS ON ALGORITHMS*
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- **Improved Approximation Algorithms for Label Cover Problems**
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  Bateni, M., Charikar, M., Guruswami, V.
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- **Integrality Gaps for Sherali-Adams Relaxations** *STOC'09: PROCEEDINGS OF THE 2009 ACM SYMPOSIUM ON THEORY OF COMPUTING*
  Charikar, M., Makarychev, K., Makarychev, Y.
  2009: 283-292

- **Aggregating Inconsistent Information: Ranking and Clustering** *JOURNAL OF THE ACM*
  Ailon, N., Charikar, M., Newman, A.
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- **Online Multicast with Egalitarian Cost Sharing** *SPAA'08: PROCEEDINGS OF THE TWENTIETH ANNUAL SYMPOSIUM ON PARALLELISM IN ALGORITHMS AND ARCHITECTURES*
  Charikar, M., Karloff, H., Mathieu, C., Naor, J. (., Saks, M.
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- **Sizing Sketches: A Rank-Based Analysis for Similarity Search** *SIGMETRICS'07: PROCEEDINGS OF THE 2007 INTERNATIONAL CONFERENCE ON MEASUREMENT & MODELING OF COMPUTER SYSTEMS*
  Wang, Z., Dong, W., Josephson, W., Lv, Q., Charikar, M., Li, K.
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- **A Divide and Conquer Algorithm for d-Dimensional Arrangement**
  Charikar, M., Makarychev, K., Makarychev, Y., SIAM/ACM
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- **Near-Optimal Algorithms for Maximum Constraint Satisfaction Problems**
  Charikar, M., Makarychev, K., Makarychev, Y., SIAM/ACM
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- **On finding frequent elements in a data stream** *APPROXIMATION, RANDOMIZATION, AND COMBINATORIAL OPTIMIZATION: ALGORITHMS AND TECHNIQUES*

Charikar, M., Chen, K., Farach-Colton, M.
2007; 4627: 584-?

- **On the advantage over random for maximum acyclic subgraph** *48TH ANNUAL IEEE SYMPOSIUM ON FOUNDATIONS OF COMPUTER SCIENCE, PROCEEDINGS*
  Charikar, M., Makarychev, K., Makarychev, Y.
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- **Local global tradeoffs in metric embeddings** *48TH ANNUAL IEEE SYMPOSIUM ON FOUNDATIONS OF COMPUTER SCIENCE, PROCEEDINGS*
  Charikar, M., Makarychev, K., Makarychev, Y.
  2007: 713-723
- **Improved Approximation for Directed Cut Problems** *STOC 07: PROCEEDINGS OF THE 39TH ANNUAL ACM SYMPOSIUM ON THEORY OF COMPUTING*
  Agarwal, A., Alon, N., Charikar, M.
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- **Special issue on FOCS 2001 - Guest editor's foreword** *JOURNAL OF COMPUTER AND SYSTEM SCIENCES*
  Charikar, M.
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- **On the integrality ratio for the asymmetric traveling salesman problem** *MATHEMATICS OF OPERATIONS RESEARCH*
  Charikar, M., Goemans, M. X., Karloff, H.
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- **A Robust Maximum Completion Time Measure for Scheduling**
  Charikar, M., Khuller, S., SIAM/ACM
  SIAM.2006: 324-+
- **I(2)(2) Spreading Metrics For Vertex Ordering Problems**
  Charikar, M., Hajiaghayi, M., Karloff, H., Rao, S., SIAM/ACM
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- **Directed Metrics and Directed Graph Partitioning Problems**
  Charikar, M., Makarychev, K., Makarychev, Y., SIAM/ACM
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- **Clustering with qualitative information** *JOURNAL OF COMPUTER AND SYSTEM SCIENCES*
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