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- 1046 [1] https://cwiki.apache.org/confluence/display/IOTDB/Query+Fundamentals.
- 1047 [2] https://debs.org/grand-challenges/2012/.
 - [3] https://github.com/apache/iotdb/tree/research/M4-visualization.
 - [4] https://github.com/LeiRui/M4-visualization-exp.
 - [5] https://iotdb.apache.org.
- [6] https://iotdb.apache.org/UserGuide/Master/Operators-Functions/Sample.html#m4-function.
 - [7] https://www.iis.fraunhofer.de/en/ff/lv/dataanalytics/ek/download.html.
 - [8] https://www.influxdata.com/.
 - [9] S. Agarwal, B. Mozafari, A. Panda, H. Milner, S. Madden, and I. Stoica. Blinkdb: queries with bounded errors and bounded response times on very large data. In Z. Hanzálek, H. Härtig, M. Castro, and M. F. Kaashoek, editors, Eighth Eurosys Conference 2013, EuroSys '13, Prague, Czech Republic, April 14-17, 2013, pages 29–42. ACM, 2013.
 - [10] R. Agrawal, C. Faloutsos, and A. N. Swami. Efficient similarity search in sequence databases. In D. B. Lomet, editor, Foundations of Data Organization and Algorithms, 4th International Conference, FODO'93, Chicago, Illinois, USA, October 13-15, 1993, Proceedings, volume 730 of Lecture Notes in Computer Science, pages 69–84. Springer, 1993.
 - [11] K. Chan and A. W. Fu. Efficient time series matching by wavelets. In M. Kitsure-gawa, M. P. Papazoglou, and C. Pu, editors, Proceedings of the 15th International Conference on Data Engineering, Sydney, Australia, March 23-26, 1999, pages 126–133. IEEE Computer Society, 1999.
 - [12] G. Cormode, M. N. Garofalakis, P. J. Haas, and C. Jermaine. Synopses for massive data: Samples, histograms, wavelets, sketches. Found. Trends Databases, 4(1-3):1–294, 2012.
 - [13] N. Dayan, M. Athanassoulis, and S. Idreos. Monkey: Optimal navigable keyvalue store. In S. Salihoglu, W. Zhou, R. Chirkova, J. Yang, and D. Suciu, editors, Proceedings of the 2017 ACM International Conference on Management of Data, SIGMOD Conference 2017, Chicago, IL, USA, May 14-19, 2017, pages 79–94. ACM, 2017.
 - [14] N. Dayan and S. Idreos. Dostoevsky: Better space-time trade-offs for lsm-tree based key-value stores via adaptive removal of superfluous merging. In G. Das, C. M. Jermaine, and P. A. Bernstein, editors, Proceedings of the 2018 International Conference on Management of Data, SIGMOD Conference 2018, Houston, TX, USA, June 10-15, 2018, pages 505-520. ACM, 2018.
 - [15] N. Dayan and S. Idreos. The log-structured merge-bush & the wacky continuum. In P. A. Boncz, S. Manegold, A. Ailamaki, A. Deshpande, and T. Kraska, editors, Proceedings of the 2019 International Conference on Management of Data, SIGMOD Conference 2019, Amsterdam, The Netherlands, June 30 July 5, 2019, pages 449–466. ACM, 2019.
 - [16] P. Esling and C. Agón. Time-series data mining. ACM Comput. Surv., 45(1):12:1– 12:34. 2012.
 - [17] C. Fang, S. Song, and Y. Mei. On repairing timestamps for regular interval time series. Proc. VLDB Endow., 15(9):1848–1860, 2022.
 - [18] T. Fu. A review on time series data mining. Eng. Appl. Artif. Intell., 24(1):164–181, 2011
 - [19] J. Grabocka, N. Schilling, M. Wistuba, and L. Schmidt-Thieme. Learning timeseries shapelets. In S. A. Macskassy, C. Perlich, J. Leskovec, W. Wang, and R. Ghani, editors, The 20th ACM SIGKDD International Conference on Knowledge Discovery and Data Mining, KDD '14, New York, NY, USA - August 24 - 27, 2014, pages 392–401. ACM, 2014.
 - [20] J. Gray, S. Chaudhuri, A. Bosworth, A. Layman, D. Reichart, M. Venkatrao, F. Pellow, and H. Pirahesh. Data cube: A relational aggregation operator generalizing group-by, cross-tab, and sub totals. *Data Min. Knowl. Discov.*, 1(1):29–53, 1997.
 - [21] S. Idreos and M. Callaghan. Key-value storage engines. In D. Maier, R. Pottinger, A. Doan, W. Tan, A. Alawini, and H. Q. Ngo, editors, Proceedings of the 2020 International Conference on Management of Data, SIGMOD Conference 2020, online conference [Portland, OR, USA], June 14-19, 2020, pages 2667–2672. ACM, 2020.
 - [22] S. Idreos, N. Dayan, W. Qin, M. Akmanalp, S. Hilgard, A. Ross, J. Lennon, V. Jain, H. Gupta, D. Li, and Z. Zhu. Design continuums and the path toward self-designing key-value stores that know and learn. In 9th Biennial Conference on Innovative Data Systems Research, CIDR 2019, Asilomar, CA, USA, January 13-16, 2019, Online Proceedings. www.cidrdb.org, 2019.
 - [23] S. K. Jensen, T. B. Pedersen, and C. Thomsen. Time series management systems: A survey. IEEE Trans. Knowl. Data Eng., 29(11):2581–2600, 2017.
 - [24] U. Jugel. Visualization-driven data aggregation: rethinking data acquisition for data visualizations. PhD thesis, Technical University of Berlin, Germany, 2017.
 - [25] U. Jugel, Z. Jerzak, G. Hackenbroich, and V. Markl. M4: A visualization-oriented time series data aggregation. *Proc. VLDB Endow.*, 7(10):797–808, 2014.
 - [26] Y. Kang, X. Huang, S. Song, L. Zhang, J. Qiao, C. Wang, J. Wang, and J. Feinauer. Separation or not: On handing out-of-order time-series data in leveled lsm-tree. In 38th IEEE International Conference on Data Engineering, ICDE 2022, pages 3340–3352. IEEE, 2022.
 - [27] E. J. Keogh, K. Chakrabarti, M. J. Pazzani, and S. Mehrotra. Dimensionality reduction for fast similarity search in large time series databases. *Knowl. Inf. Syst.*, 3(3):263–286, 2001.

- [28] F. Korn, H. V. Jagadish, and C. Faloutsos. Efficiently supporting ad hoc queries in large datasets of time sequences. In J. Peckham, editor, SIGMOD 1997, Proceedings ACM SIGMOD International Conference on Management of Data, May 13-15, 1997, Tucson, Arizona, USA, pages 289–300. ACM Press, 1997.
- [29] T. Kraska, A. Beutel, E. H. Chi, J. Dean, and N. Polyzotis. The case for learned index structures. In G. Das, C. M. Jermaine, and P. A. Bernstein, editors, Proceedings of the 2018 International Conference on Management of Data, SIGMOD Conference 2018, Houston, TX, USA, June 10-15, 2018, pages 489-504. ACM, 2018.
- [30] Y. Li, Z. Wang, B. Ding, and C. Zhang. Automl: A perspective where industry meets academy. In F. Zhu, B. C. Ooi, and C. Miao, editors, KDD '21: The 27th ACM SIGKDD Conference on Knowledge Discovery and Data Mining, Virtual Event, Singapore, August 14-18, 2021, pages 4048–4049. ACM, 2021.
- [31] C. Lin, E. Boursier, and Y. Papakonstantinou. Plato: Approximate analytics over compressed time series with tight deterministic error guarantees. *Proc. VLDB Endow.*, 13(7):1105–1118, 2020.
- [32] J. Lin, E. J. Keogh, L. Wei, and S. Lonardi. Experiencing SAX: a novel symbolic representation of time series. *Data Min. Knowl. Discov.*, 15(2):107–144, 2007.
- [33] C. Liu, K. Zhang, H. Xiong, G. Jiang, and Q. Yang. Temporal skeletonization on sequential data: patterns, categorization, and visualization. In S. A. Macskassy, C. Perlich, J. Leskovec, W. Wang, and R. Ghani, editors, The 20th ACM SIGKDD International Conference on Knowledge Discovery and Data Mining, KDD '14, New York, NY, USA - August 24 - 27, 2014, pages 1336–1345. ACM, 2014.
- [34] R. Marcus, A. Kipf, A. van Renen, M. Stoian, S. Misra, A. Kemper, T. Neumann, and T. Kraska. Benchmarking learned indexes. *Proc. VLDB Endow.*, 14(1):1–13, 2020.
- [35] P. E. O'Neil, E. Cheng, D. Gawlick, and E. J. O'Neil. The log-structured mergetree (lsm-tree). Acta Informatica, 33(4):351–385, 1996.
- [36] Y. Park, M. J. Cafarella, and B. Mozafari. Visualization-aware sampling for very large databases. In 32nd IEEE International Conference on Data Engineering, ICDE 2016, Helsinki, Finland, May 16-20, 2016, pages 755-766. IEEE Computer Society, 2016.
- [37] J. Shieh and E. J. Keogh. isax: indexing and mining terabyte sized time series. In Y. Li, B. Liu, and S. Sarawagi, editors, Proceedings of the 14th ACM SIGKDD International Conference on Knowledge Discovery and Data Mining, Las Vegas, Nevada, USA, August 24-27, 2008, pages 623-631. ACM, 2008.
- [38] C. Wang and B. Ding. Fast approximation of empirical entropy via subsampling. In A. Teredesai, V. Kumar, Y. Li, R. Rosales, E. Terzi, and G. Karypis, editors, Proceedings of the 25th ACM SIGKDD International Conference on Knowledge Discovery & Data Mining, KDD 2019, Anchorage, AK, USA, August 4-8, 2019, pages 658–667. ACM, 2019.
- [39] C. Wang, X. Huang, J. Qiao, T. Jiang, L. Rui, J. Zhang, R. Kang, J. Feinauer, K. Mcgrail, P. Wang, D. Luo, J. Yuan, J. Wang, and J. Sun. Apache iotdb: Time-series database for internet of things. *Proc. VLDB Endow.*, 13(12):2901–2904, 2020.
- [40] J. Xiao, Y. Huang, C. Hu, S. Song, X. Huang, and J. Wang. Time series data encoding for efficient storage: A comparative analysis in apache iotdb. *Proc.* VLDB Endow, 15, 2022.
- [41] L. Ye and E. J. Keogh. Time series shapelets: a new primitive for data mining. In J. F. E. IV, F. Fogelman-Soulié, P. A. Flach, and M. J. Zaki, editors, Proceedings of the 15th ACM SIGKDD International Conference on Knowledge Discovery and Data Mining, Paris, France, June 28 - July 1, 2009, pages 947–956. ACM, 2009.

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