use matrix multiplication algorithms.

for sparse matrix: [3], [1].

for dense matrix: the current best algorithm is $O(n^{2.3728639})$ [2].

References

[1] François Le Gall. Faster algorithms for rectangular matrix multiplication. In 2012 IEEE 53rd annual symposium on foundations of computer science, pages 514–523. IEEE, 2012.

- [2] François Le Gall. Powers of tensors and fast matrix multiplication. In *Proceedings of the 39th international symposium on symbolic and algebraic computation*, pages 296–303. ACM, 2014.
- [3] Raphael Yuster and Uri Zwick. Fast sparse matrix multiplication. ACM Transactions On Algorithms (TALG), 1(1):2–13, 2005.