



## *A simple deterministic pseudopolynomial time algorithms for subset sum*

**Chao Xu**  
**The Voleon Group**

**Time:** 11:00AM(Time in Beijing)

4:00PM(Time in Auckland)

January 6, 2021 (Wednesday)

**VooV meeting ID:** 360 572 001 Password: 1936

**Link:** <https://meeting.tencent.com/s/Hu6RyhQq2MPc>

**Abstract:** Given a set of  $n$  positive integers and a target integer  $t$ , the subset sum problem asks if there exists a subset with elements sum to  $t$ . Bellman (1956) found a dynamic programming algorithm that solves the problem in  $O(nt)$  time. There were no significant improvements in running time until Koiliaris and Xu (2017) gave a  $\tilde{O}(\min(\sqrt{nt}, t^{4/3}))$  time algorithm based on exponentially growing partitions. Since then, multiple papers on the topic come out each year.

We give a survey of the recent progress on pseudopolynomial time algorithms for subset sum and its extensions, and describes a much simplified and improved deterministic algorithm by Koiliaris and Xu (2019) with running time  $\tilde{O}(\min(\sqrt{nt}, t^{5/4}))$ . The algorithm achieves  $\tilde{O}(\sqrt{nt})$  by choosing a better partitioning strategy (partition by congruence), so the entire algorithm and its analysis fits in a single page.

**Speaker Bio:** Chao Xu works in the field of combinatorial optimization and has published a serial of papers in SODA, RANDOM, ESA, SOSA, SIAM J. Computing, SIAM J. Disc. Math., Math. Program., and so on. He got his PhD in computer science from UIUC in 2018. Since then, he has worked at Yahoo! Research and Grab. He is currently a software engineer at Voleon.

**Chengdu Algorithms and Logic Seminar** is a series of online seminars organized by School of Computer Science and Engineering, University of Electronic Science and Technology of China, and School of Computer Science, University of Auckland that aims to promote collaborations in a broad range of topics in algorithms and logic.

**Organizers:** Bakhadyr Khossainov, Jiamou Liu, and Mingyu Xiao

**Email:** [myxiao@gmail.com](mailto:myxiao@gmail.com) (Mingyu Xiao)