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Low discrepancy words and dynamical systems

Abstract: The chairman assignment problem can be stated as follows: k states are assumed to form a union and each year a union chairman must be selected so that at any time the cumulative number of chairmen of each state is proportional to its weight. It is closely related to the (discrete) apportionment problem, which has its origins in the question of allocating seats in the house of representatives in the United States, in a proportional way to the population of each state. The richness of this problem lies in the fact that it can be reformulated both as a sequencing problem in operations research for optimal routing and scheduling, and as a symbolic discrepancy problem, in the field of word combinatorics, where the discrepancy measures the difference between the number of occurrences of a letter in a prefix of an infinite word and the expected value in terms of frequency of occurrence of this letter. We will see in this lecture how to construct infinite words with values in a finite alphabet having the smallest possible discrepancy, by revisiting a construction due to R. Tijdeman in terms of dynamical systems.

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