Algorithm Analysis Mission3/31

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In this video, the main topic is Discrete Fourier Transform (DFT). Since analog data input as an infinite continuous wave has infinite data in the time line due to its characteristics, sampling is inevitable for ideal digital analysis. However, since the precision of the waveform naturally decreases when sampling is performed, “discrete” Fourier transform is performed with as “much” sampled data as possible for ideal calculation. However, since a lot of sampling data is calculated for high precision, a lot of computing resources are required. Since n data points and n multiplication are required for one discrete Fourier transform, N^2 calculations are required. This is a calculation amount that would take more than three years at the computer speed of the 1960s. However, as a calculation method called fast Fourier transform became known, the amount of calculation could be drastically reduced. This utilizes the characteristic of a regular wave, and it is possible to omit the multiplication of different points where different frequencies meet. In a specific section, the smallest DFT that can be calculated is calculated using the characteristics of a regular wave with the same sine value, and this is reused in the next calculation. The calculation time is drastically reduced. This is a calculation method with a time complexity of N log N, and the time required for calculation decreases exponentially as the data set grows. Since this approach process is identical to dynamic programming in which calculation results are omitted or already calculated values are used, Fast Fourier Transform can be referred to as DP.