Proactive Caching for Spatial Queries in Mobile Environments & Cache Invalidation and Replacement Strategies for Location-Dependent Data in Mobile Environments

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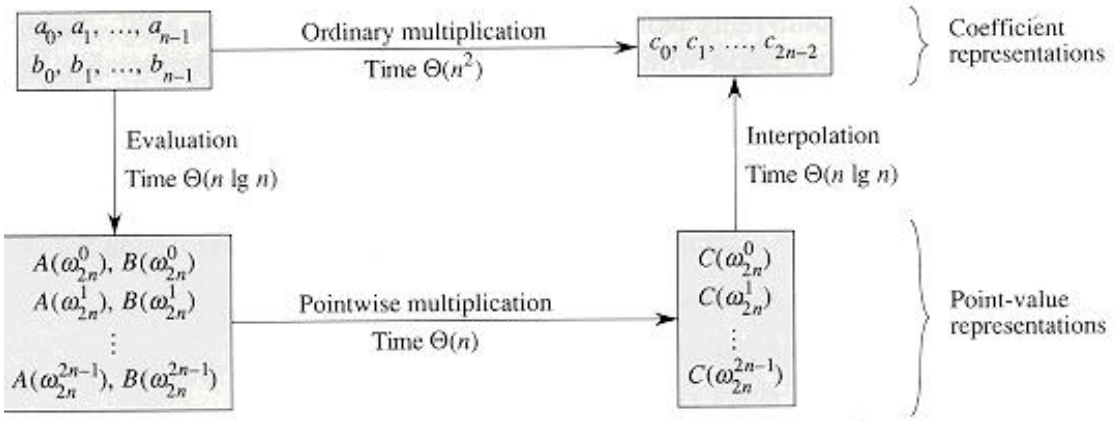
Fast Fourier Transformation

Speeds up calculations of DFT (Discrete Fourier transform)
Used for fast:

- Addition of polynomials
- Multiplication of polynomials
- Conversion between Coefficient Representation & Point-value Representation



Polynomials

$$A(x) = \sum_{j=0}^{n-1} a_j x^i, \qquad a_j x^3 + a_{j-1} x^2 - a_{j-2} x + 4 \qquad (1)$$

Degree: highest non-zero coefficient

Degree-bound: Any integer strictly larger than the bound for $A(x)$

Polynomial Addition

$$A(x) = 6x^3 + 7x^2 - 10x + 9 \quad (2)$$
$$B(x) = -2x^3 + 4x - 5 \quad (3)$$
$$C(x) = 4x^3 + 7x^2 - 6x + 4 \quad (4)$$

$$\begin{aligned} A(x) &= 6x^3 + 7x^2 - 10x + 9 \\ B(x) &= -2x^3 + + 4x - 5 \\ \hline C(x) &= 4x^3 + 7x^2 - 6x + 4 \end{aligned}$$

Polynomial Multiplication

Fast Fourier Transformation