Addition using Merging

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Polynomial Data Structures and Polynomial +, −, ×, ÷ Algorithms

Sparse Polynomial addition using merging.

$a = 7x^{10} - 3x^{8} + 6x^{3} + 4x^{0}$ (i = 1, 2, 3, 4, 5)

$+ \; b = 3x^{8} + 6x^{3} + 5x^{2}$ (j = 1, 2, 3, 4)

Assume terms are sorted by degree and a sparse D.S. is used.

Store $a = [[7,10], [-3,8], [6,3], [4,0]]$

$7 \cdot x^{10} \quad -3 \cdot x^{8} \quad +6 \cdot x^{3} + 4x^{0}$

Merge: $C = a + b =$

$x^{10} > x^{8} \quad x^{8} = x^{8} \quad x^{3} = x^{3} \quad x^{2} > x^{0}$

$7x^{10} \quad +0 \quad +12x^{3} \quad +5x^{2} + 4x^{0}$

$k=0 \quad k=1 \quad k=1 \quad k=2 \quad k=3 \quad k=4$

How many monomial comparisons did we do?

Count $<$ $=$ $>$ as one comparison.

Let #a be the # of terms of the polynomial a.

After every comparison we advance either i or j or both.

Hence #comparisons $\leq$ #a + #b − 1.