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7

**University College Dublin**

COMP41610 – Practical 3 – Neil Grogan - 13204052

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08

**Fall**

1. **Matrix multiplication**

**Map**

For the map function we could split the matrices in to the numbers they will multiplied by:

A = 2\*2 matrix:

[1,2]

[3,4]

B = 2\*2 matrix:

[5,6]

[7,8]

would become:

(A[0,0], B[0,0]) -> (0,0 [1,5])

(A[0,1], B[1,0]) -> (0,0 [2,7])

**Reduce**Reducefunction we could then multiply this line on each core (and every other line at the same time):

(0, 1), \* (0,5) = (0,5)

(0, 2), \* (0,7) = (0,14)

This could then be further reduced by adding the result of the multiplication:

(0,0) = (0,5) + (0,14)

∴ (0,0) = (19)

**Mapper:**

Input: <row, [values]>

Ex: <A, [1,5]> <B, [2,7]>

Emit: <row, [value]>

Ex: <0,0, [1]>, <0,0, [5]>, <0,1, [2]>, <1,1, [7]>

**Reducer:**

Input: <row, [value]>

Ex: <0,0, [1]>, <0,0, [5]>, <0,1, [2]>, <1,1, [7]>

Emit: <rows, [values]>

Ex. <0,0, [5]>, <0,1 [14]>

Keep reducing:

Input: <rows, [value]>

Ex. <0,0, [5]>, <0,1 [14]>

Emit: <row, [value]>

Ex. <0,0, [19]>

1. **Dissimilarity Matrix**

For the map function we could split the matrix in to the numbers they will operated on:

A = {x1(5, 3), x2(2,6), x3(4,1)}

would become:

(x1(5, 3), x2(2,6)) -> (x1i [2,5]), (x2i [6,3])

(x1(5, 3), x3(4,1)) -> (x1j [4,5]), (x3j [1,3])

(x2(2,6), x3(4,1)) -> (x2k [4,2]), (x3k [1,6])

**Reduce**Reducefunction we could then minus these numbers on each core (and every other line at the same time):

(x1i [5,2]) -> 2-5 -> (x1i [-3])

(x2i [6,3]) -> 6-3 -> (x2i [3])

**Reduce**We could further reduce them by squaring these numbers on each core (and every other line at the same time):

(x1i [-3]) -> 9 ->(x1i [9])

(x2i [3]) -> 9 -> (x2i [9])

**Reduce**We could further reduce them by adding these numbers on each core (and every other line at the same time):

(x1i [9]) + (x2i [9]) -> 18 -> (x12i [18])

This could then be further reduced by getting the square root as the result:

(x12i [18]) -> 4.242640687119285

∴ (x12i ) = 4.242640687119285

**Mapper:**

Input: <segment1, [values]> <segment2, [values]>

Ex: <A, [1,5]> <B, [2,7]>

Emit: <segment\_joined, [values]>

Ex: <A\_B [1,5,2,7]>

**Reducer:**

Input: : <segment\_joined, [values]>

Ex: <A\_B [1,5,2,7]>

Emit: <seg1, [values]>, <seg2, [values]>

Ex. <A1 [2,1]>, <B1 [7,5]>

Keep reducing (minus):

Input: <seg1, [values]>, <seg2, [values]>

Ex. <A1 [2,1]>, <B1 [7,5]>

Emit: <segment, [value]>, <segment, [value]>

Ex. <A1 [1]>, <B1 [2]>

Keep reducing (square):

Input: <segment, [value]>, <segment, [value]>

Ex. <A1 [1]>, <B1 [2]>

Emit: <segment, [value]>, <segment, [value]>

Ex. <A1 [1]>, <B1 [4]>

Keep reducing (add):

Input: <segment, [value]>

Ex. <A1 [1]>, <B1 [4]>

Emit: <segment, [value]>

Ex. <A1B1 [5]>

Keep reducing (square root):

Input: <segment, [value]>

Ex. <A1B1 [5]>

Emit: <segment, [value]>

Ex. <A1B1 [2.23606797749979]>