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Exercise 1

Friday, October 19, 2018

Problem 1. *(Matrix Vector Multiplication by Map-Reduce)*

Let $\mathbf{A} \in \mathbb{R}^{n \times m}$ be a matrix with large dimensions n and m.

a) Let $\mathbf{v} \in \mathbb{R}^m$ be a vector. Explain a way to execute the multiplication of $\mathbf{A}$ and $\mathbf{v}$ using MapReduce.

b) Let $\mathbf{B} \in \mathbb{R}^{m \times k}$ be a matrix. Explain a way to execute the multiplication of $\mathbf{A}$ and $\mathbf{B}$ using MapReduce.

Problem 2. *(Sparse Vectors with Map-Reduce)*

Let $\mathbf{v} \in \mathbb{R}^n$ be a sparse vector with large dimension n.

a) Let $\mathbf{w} \in \mathbb{R}^n$ be a sparse vector. Explain a way to execute the sum of $\mathbf{v}$ and $\mathbf{w}$ using MapReduce.

b) Explain a way to execute the average squared value $\frac{1}{n}\sum_{i=1}^{n}(v_i)^2$ using MapReduce.