

# Tensor Networks

Archive 1708.00006

## Tensor notation

scalar



vector



Matrix



order 3 tensor



vector vector



matrix matrix



Number of legs = dimension of the tensor

## Contractions:

vector vector



scalar



matrix matrix



matrix



$$\sum A_k \cdot B_k$$

Dot product

$$\sum A_{ij} \cdot B_{ji}$$

Matrix multiplication

## Tensor network:

- 2 or more tensors in diagram
  - can do proofs
  - decompose large-dim tensors into smaller dim
- SVD - scalar vector decomposition  
reduce the number of dependent variables