Singular Value Decomposition

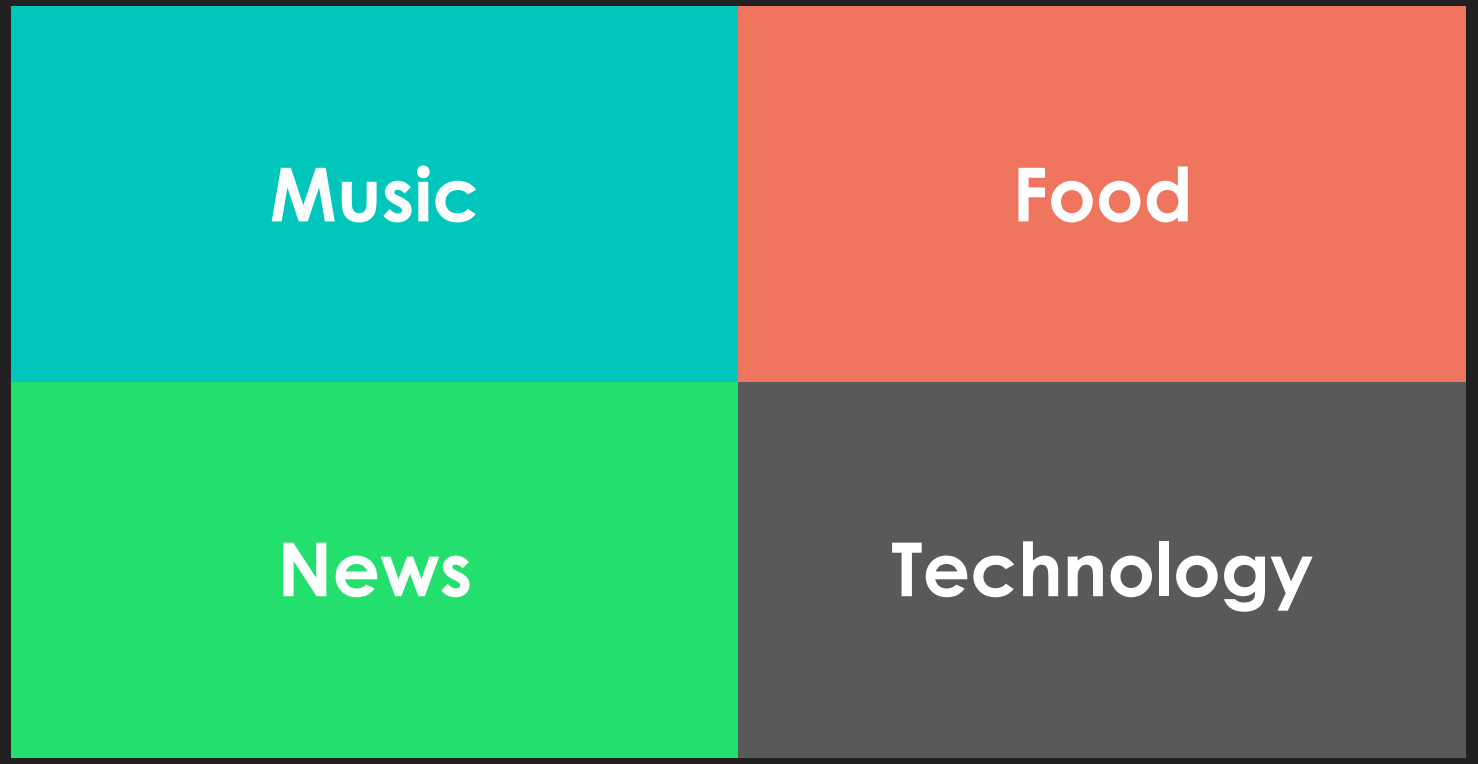
Introduction to SVD and LSA

Latent Semantic Analysis

"Latent Semantic Analysis is a technique of analysing relationships between a set of documents and the terms they contain by producing a set of concepts related to the documents and terms."

- Wikipedia

Latent Semantic Analysis



Latent Semantic Analysis

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2. Article 2
3. Article 3
4. Article 4
5. Article 5
6. Article 6

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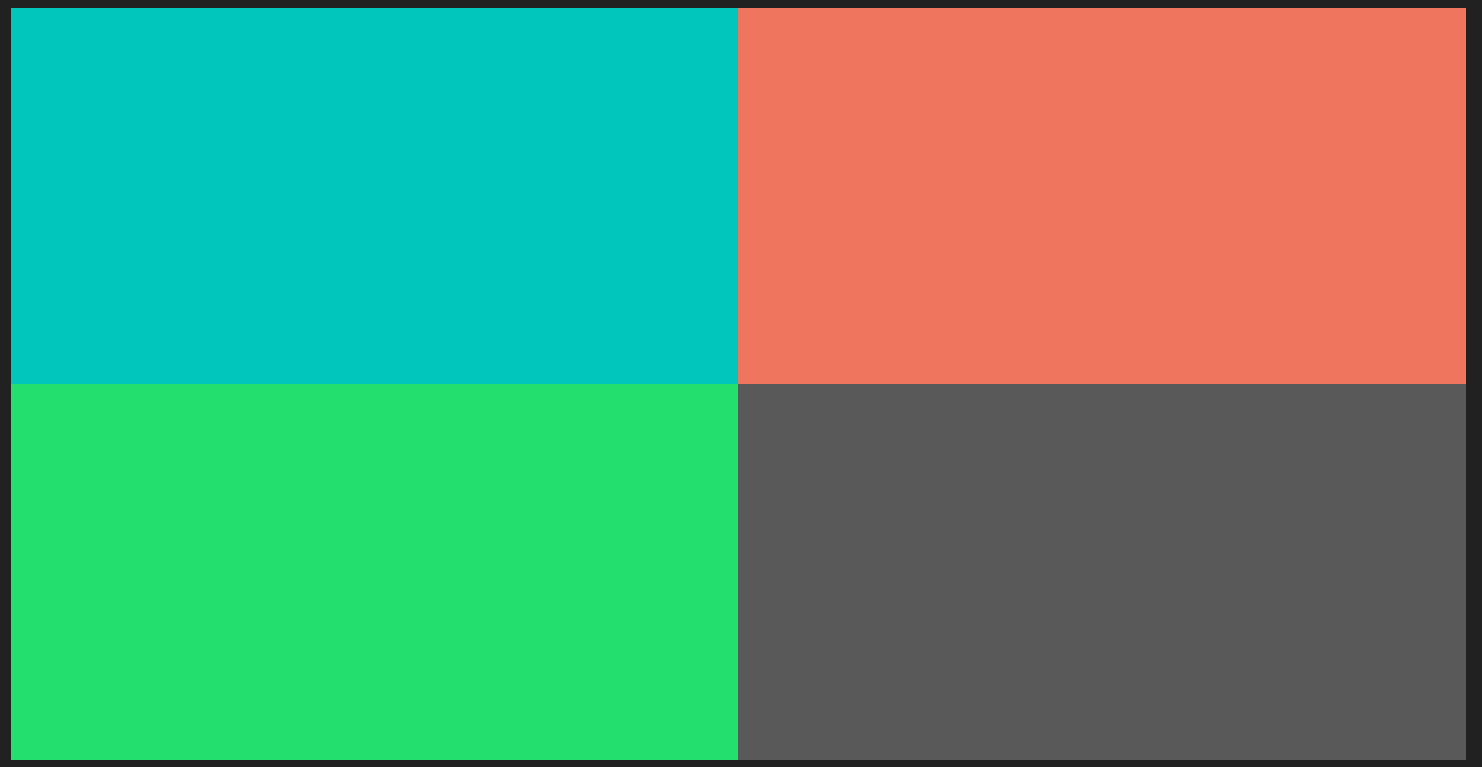

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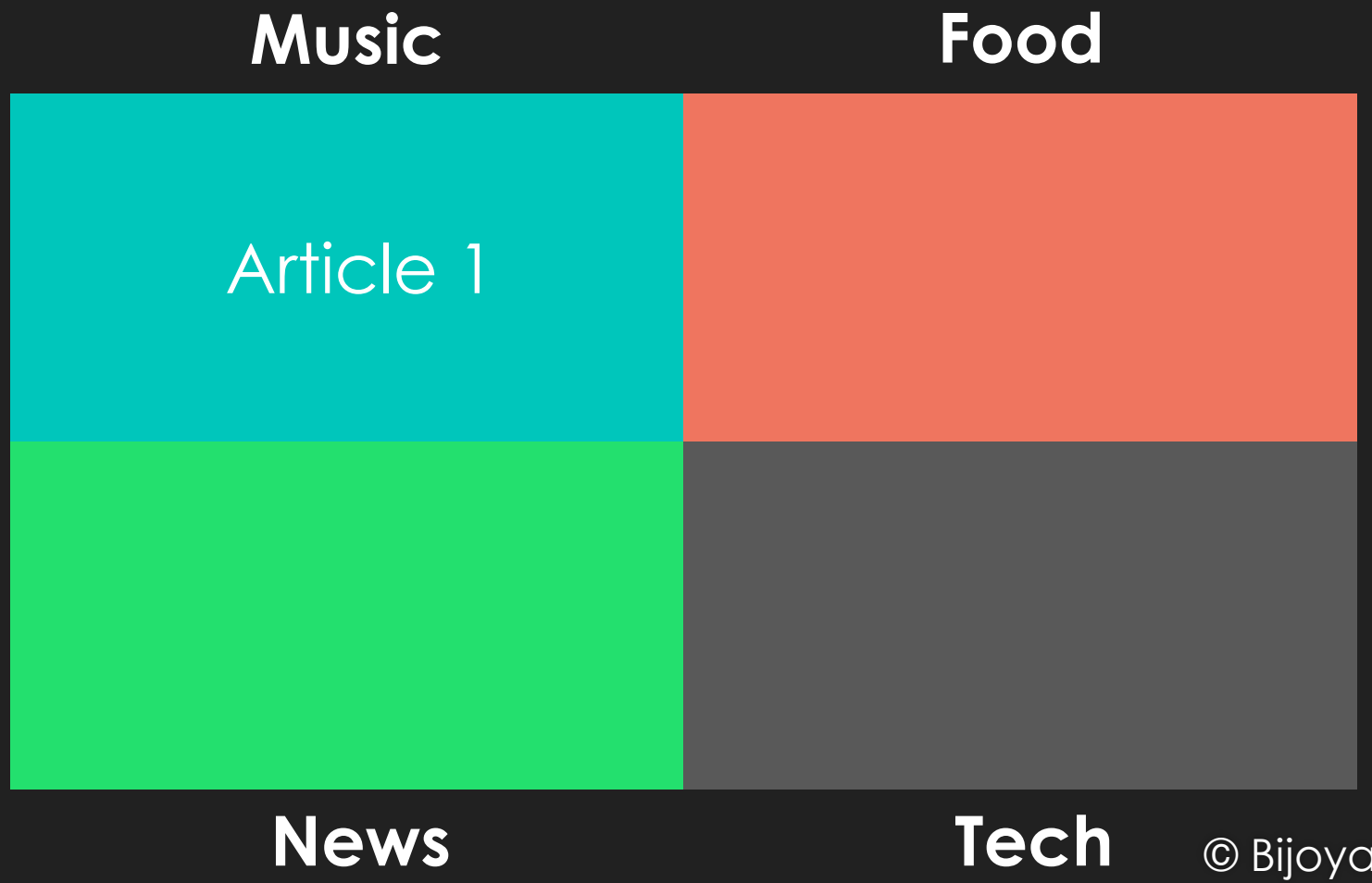

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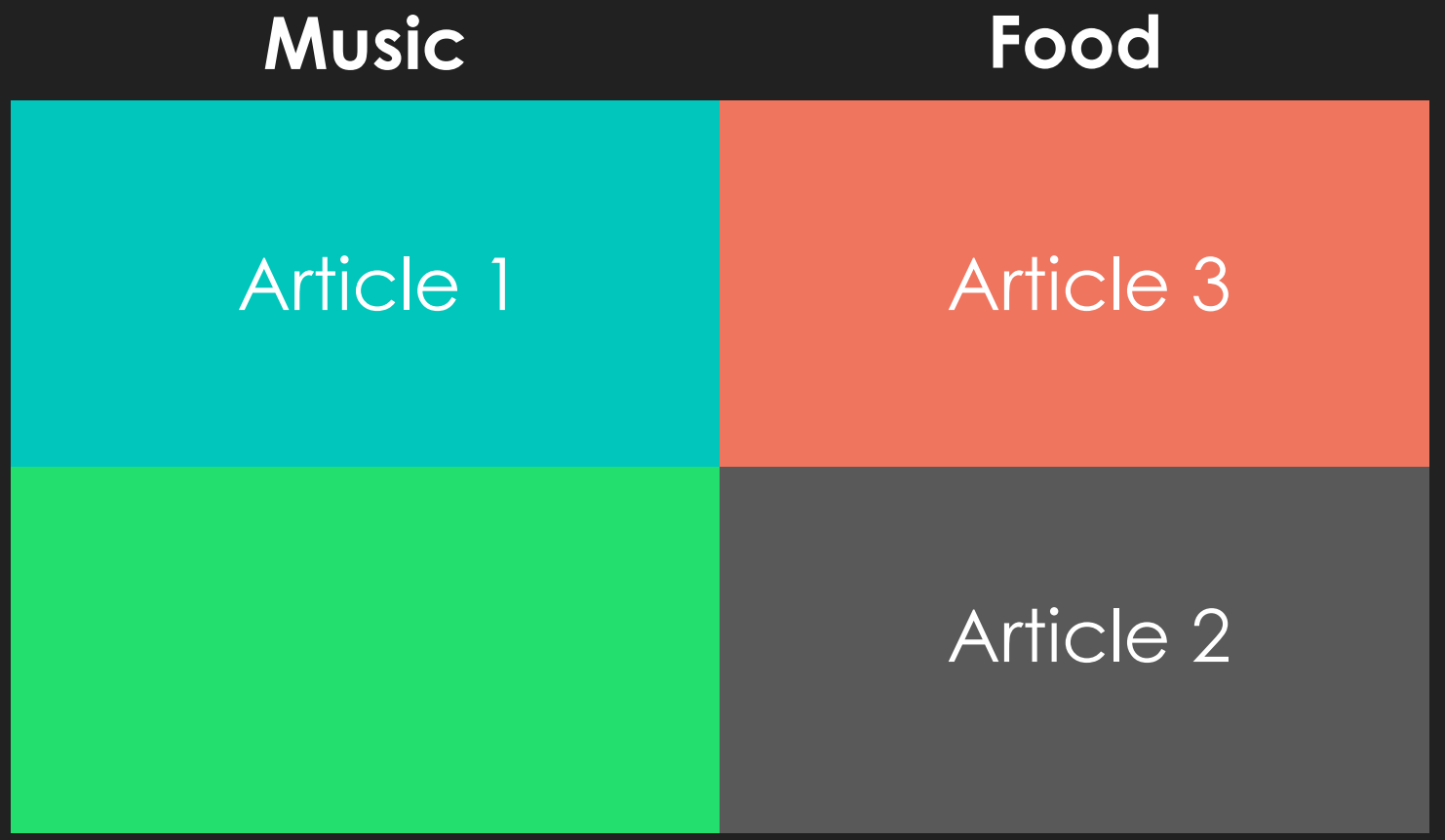

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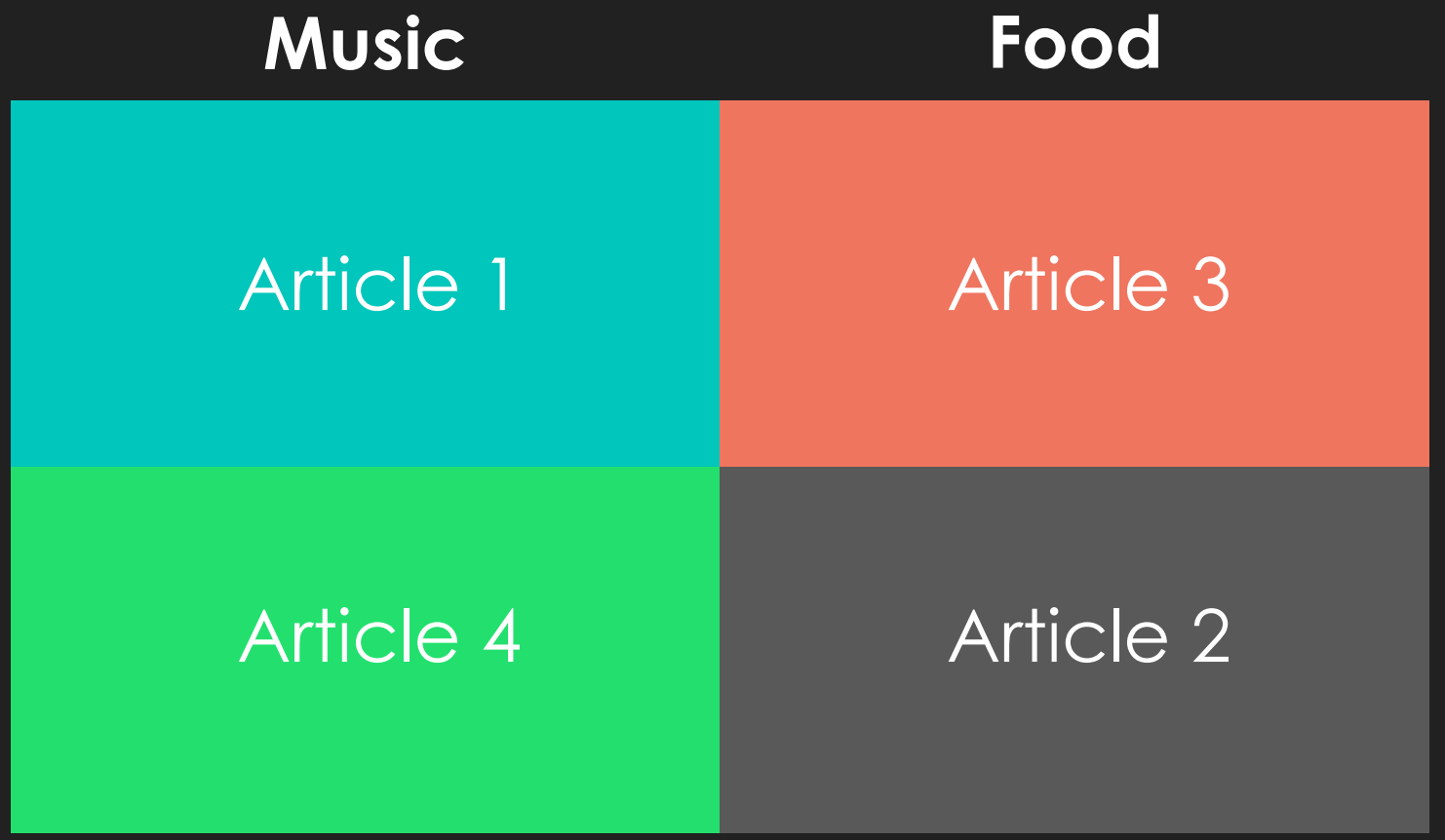

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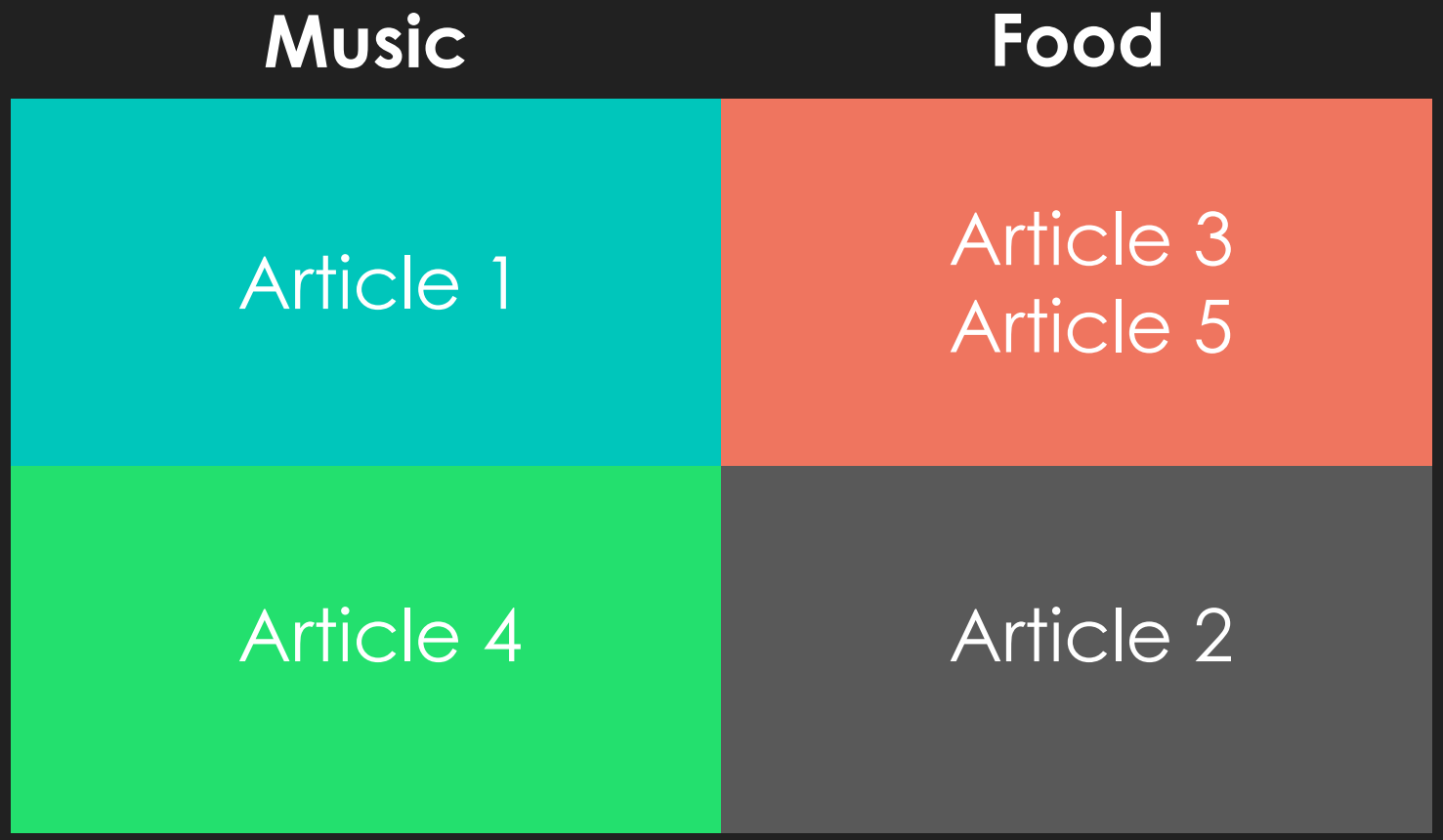

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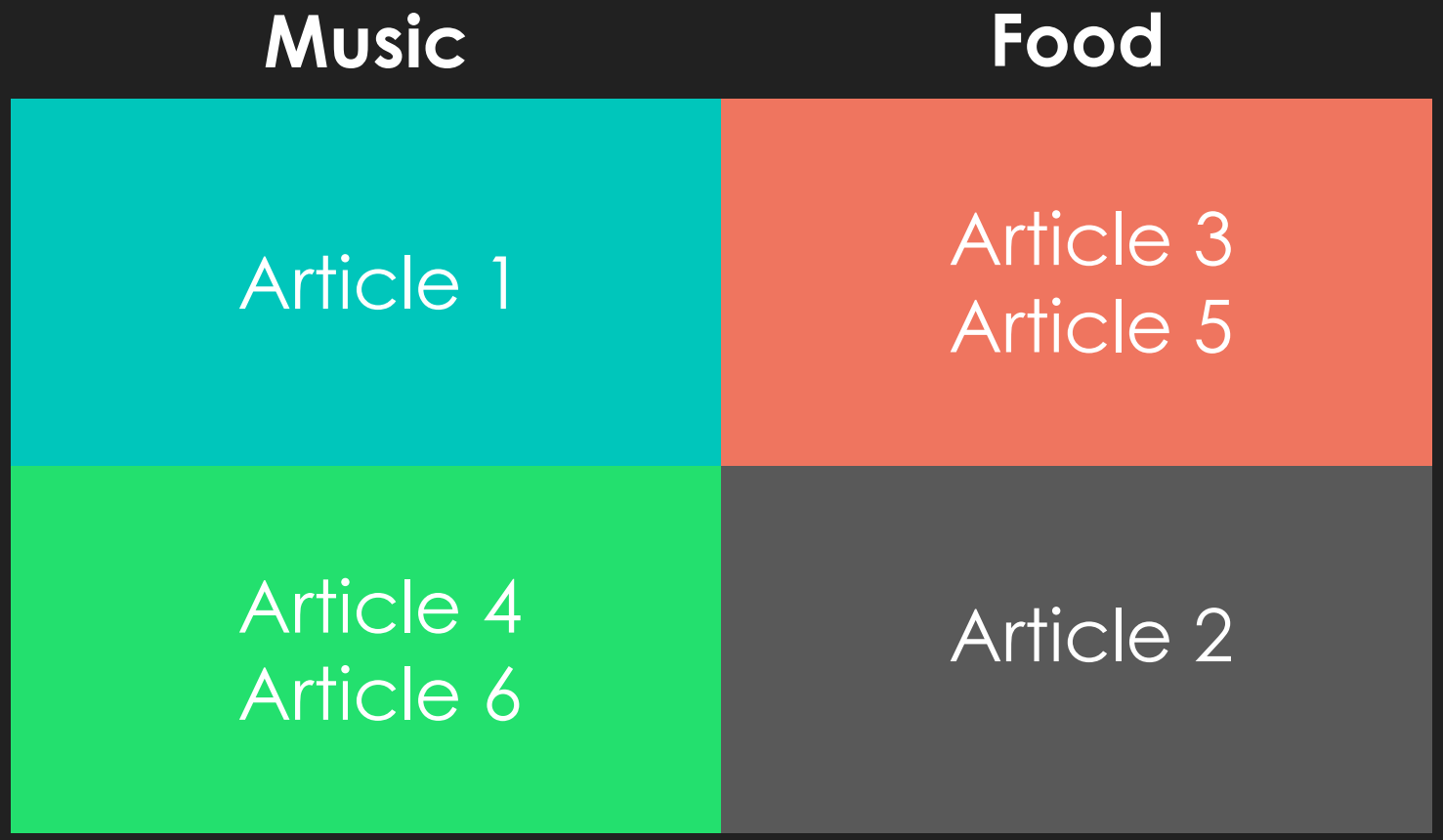

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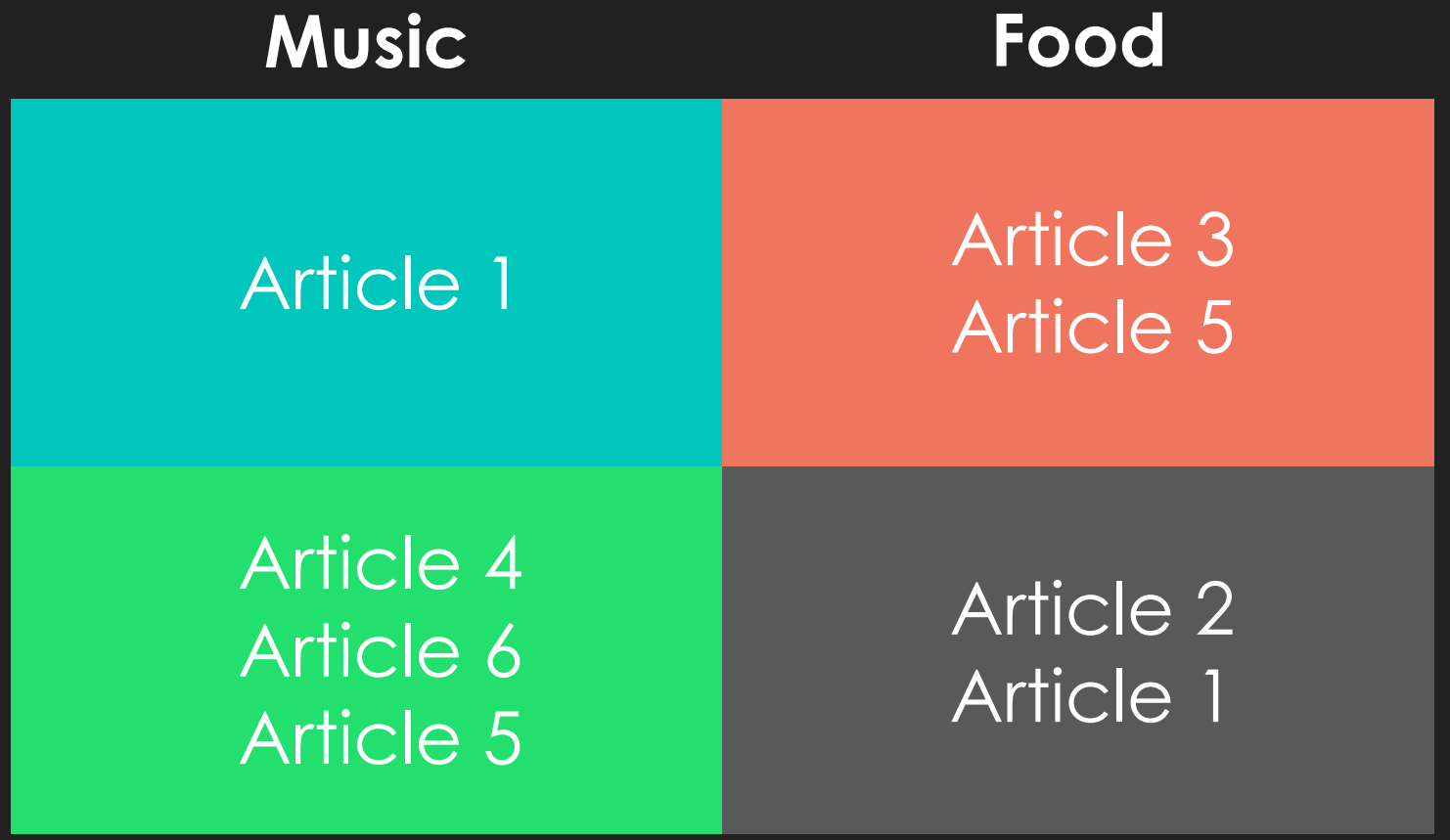

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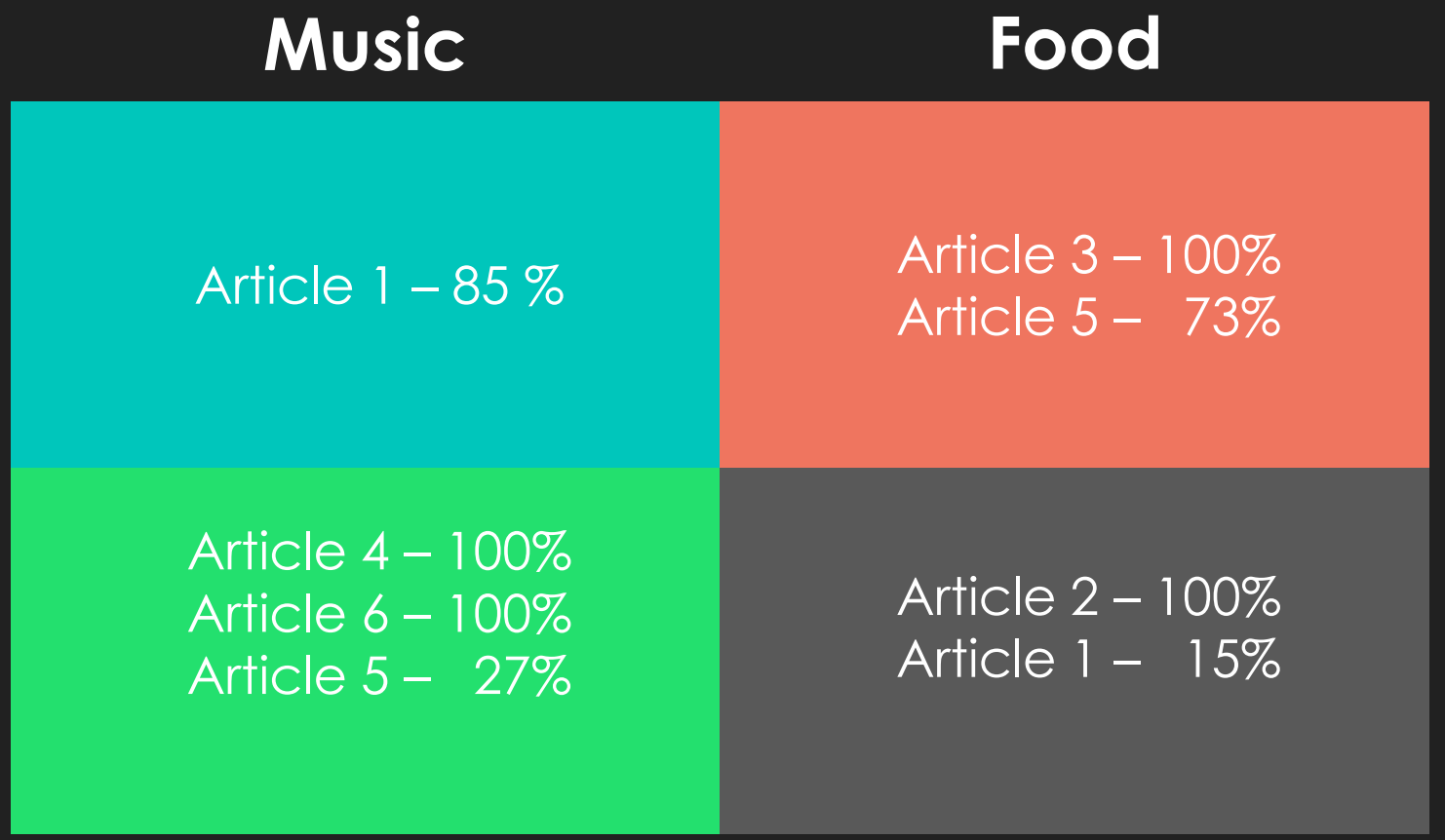


Bag Of Words Model

Words/Documents	going	to	today	i	am	it	is	rain	not	outside
1	1	1	1	0	0	1	1	1	0	0
2	1	0	1	1	1	0	0	0	1	1
3	1	1	0	1	1	0	0	0	0	0

M x N matrix

M = Number of Rows/Documents

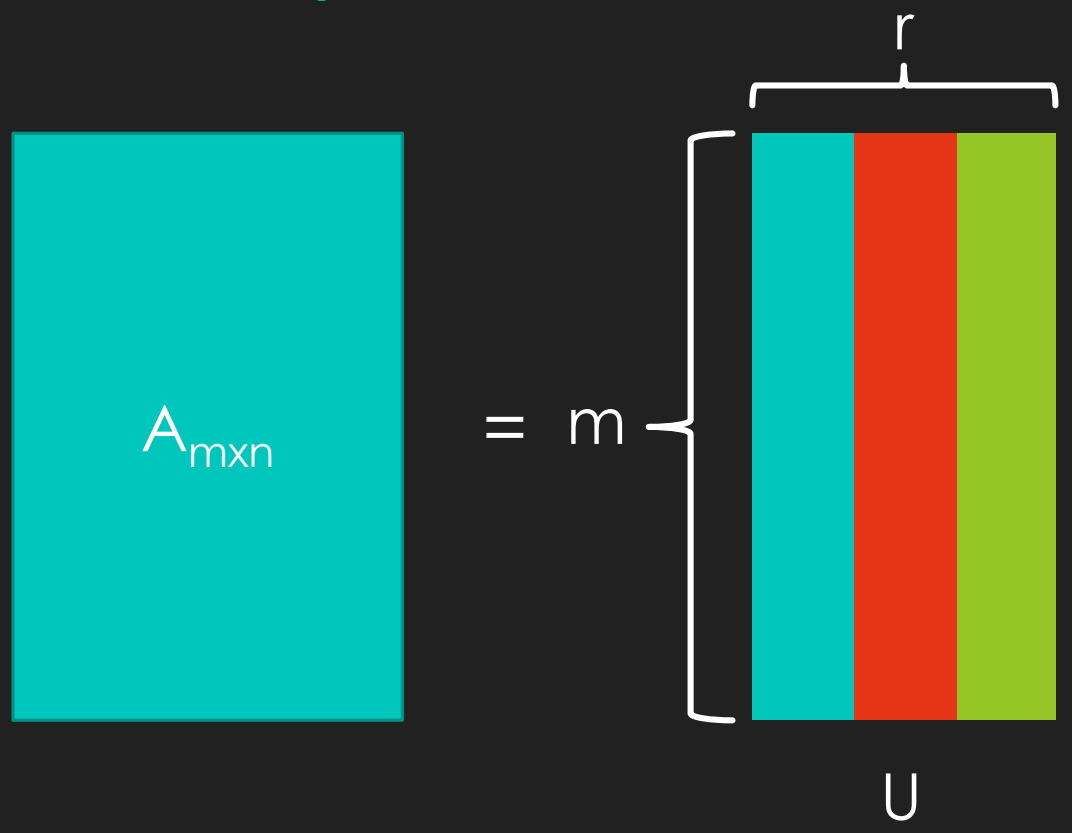
N = Number of columns/words

SVD - Definition

$$A_{[mxn]} = U_{[mxr]} * S_{[rxr]} * (V_{[nxr]})^T$$

- A : Input Data Matrix
  - m x n matrix (m = number of documents, n = number of words/features)
- U : Left Singular matrix
  - m x r matrix (m = number of documents, r = number of concepts)
- S : Rank Matrix
  - r x r matrix (r = rank of A)
- V : Right Singular Matrix
  - n x r matrix (n = number of words/features, r = number of concepts)

SVD – Visually Explained



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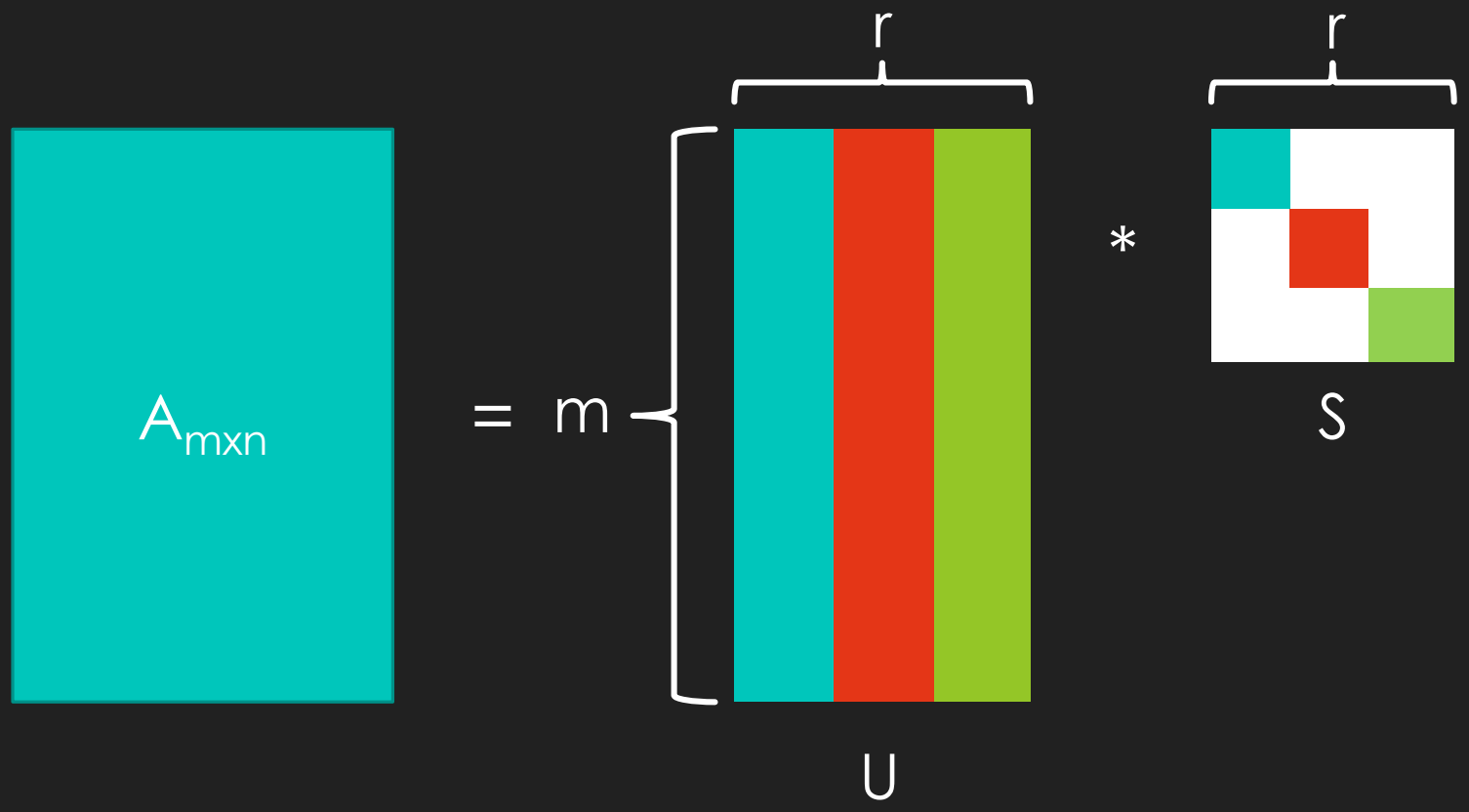

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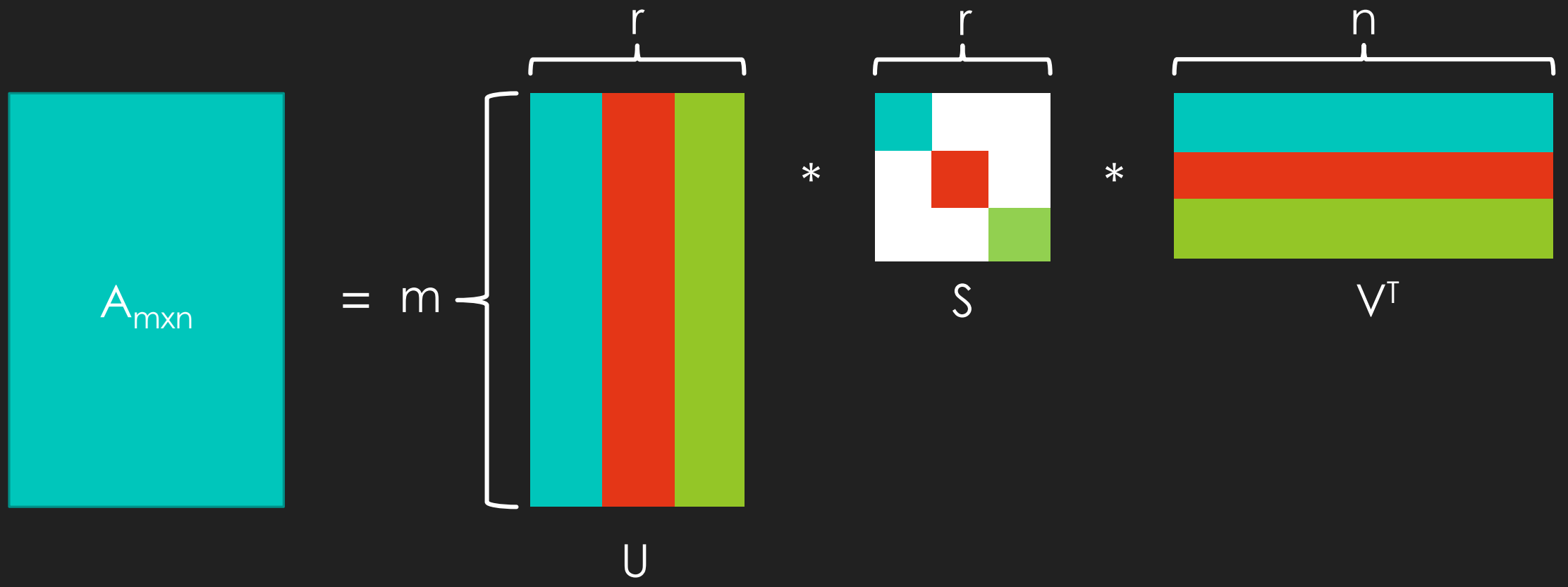

Latent Semantic Analysis – Applications

- Article Bucketing in Websites
- Finding relations between articles/words
- Page Indexing in Search Engines