



would you be able to generate an example of NMF (non negative matrix factorization), the same matrix (let's say $A=5 \times 3$) as product of a matrix $5 \times 2 * 2 \times 3$ and $5 \times 4 * 4 \times 3$. A as integers (counts)

Here is an example of Non-Negative Matrix Factorization (NMF) for an integer count matrix A of shape 5×3 , shown as the product of two decompositions: $A \approx W_{5 \times 2} \times H_{2 \times 3}$ and $A \approx W_{5 \times 4} \times H_{4 \times 3}$.

Original Matrix A (Counts)

A1	A2	A3
10	7	3
0	5	2
6	10	4
8	2	0
4	9	7

NMF: $A \approx W_{5 \times 2} \times H_{2 \times 3}$

W (5×2)

W2_1	W2_2
3.22	3.17
3.16	0.00
5.56	1.91
0.00	2.57
6.34	1.13

H (2×3)

H2_1	H2_2
0.05	3.10
1.41	0.80

H2_1	H2_2
0.90	0.00

Approximate A

A1	A2	A3
9.98	7.06	2.91
0.15	4.45	2.85
6.17	9.34	5.02
7.99	2.05	0.00
3.79	9.82	5.73

NMF: $A \approx W_{5 \times 4} \times H_{4 \times 3}$

W (5×4)

W4_1	W4_2	W4_3	W4_4
3.89	2.80	2.26	0.49
4.05	0.00	0.00	0.84
6.85	1.97	0.81	1.54
0.04	3.20	0.00	0.00
4.07	0.82	1.46	4.93

H (4×3)

H4_1	H4_2	H4_3	H4_4
0.00	2.50	1.33	0.00
1.08	0.61	0.32	0.74
0.29	0.00	0.62	1.00

Approximate A

A1	A2	A3
10.00	7.00	3.00
0.00	5.00	2.00
6.00	10.00	4.00
8.00	2.00	0.01
4.00	9.00	7.00

This example shows how NMF can closely reconstruct the original count matrix using lower-rank non-negative factors, with the approximation improving as the number of components increases.
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1. <https://docs.citrix.com/en-us/profile-management/current-release/how-it-works/architecture.html>