Two Tower Model - Positive/Negative Samples

Sunday, March 10, 2024 10:57 AM

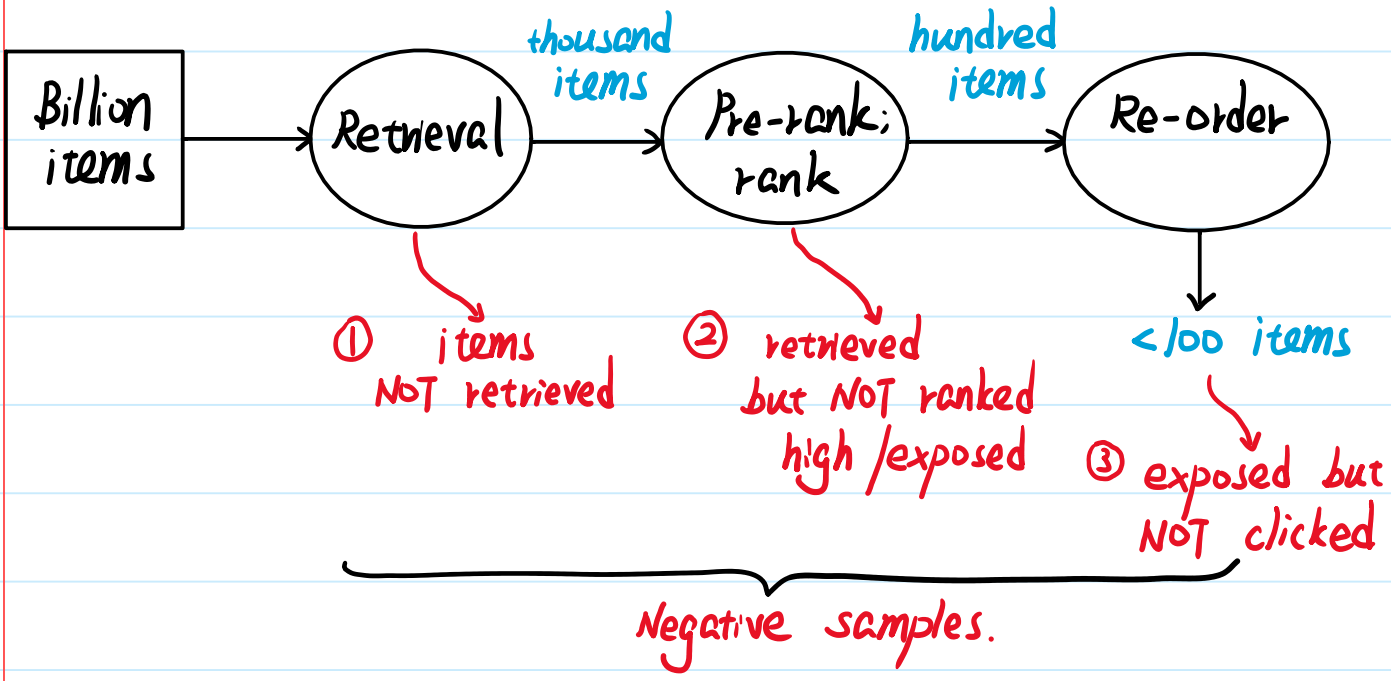
Positive Sample:

① items exposed to user and clicked by the user.

② popular items gain many likes → positive samples are mostly popular items.

③ downsampling popular items / upsampling less popular items.

Negative Sampling:



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Naive Negative Sampling:

① items NOT retrieved ≈ All samples

② select from all samples

(2.1) uniform random selection:

negative samples will be unpopular items.

unfair to unpopular items. they will be more unpopular

(2.2) non-uniform random selection:

selection probability $\propto$ (click rate)$^{0.75}$ ← empirical parameter

(2.3) negative sampling in batch:

users	items
#1	a
#2	b
⋮	⋮
#N	z

batch

positive sample: N

1-a; 2-b; ....

negative sample: N(N-1)

1-b; 1-z

2-a; -- 2-z

caution: selection probability here $\propto$ (click rate)$^{1.0}$

penalize too much on popular items.

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adapt probability:

select probability:

$p_i \propto$ (click times)

estimate like score:

$\cos(a_i, b_j)$

adjust to: $\cos(a_i, b_j) - \log p_i$

Advanced Negative Samples:

① low items in pre-rank } challenging to use.

② low items in rank }

Retrieval is a binary "classification": if users like or not

① distinguish items "retrieved" and "NOT retrieved" is easy

② low-rank items are similar to liked items.

difficult to classify.

Industry: hybrid negative samples

{ 50% from "naive" negative samples

50% from "advanced" negative samples.

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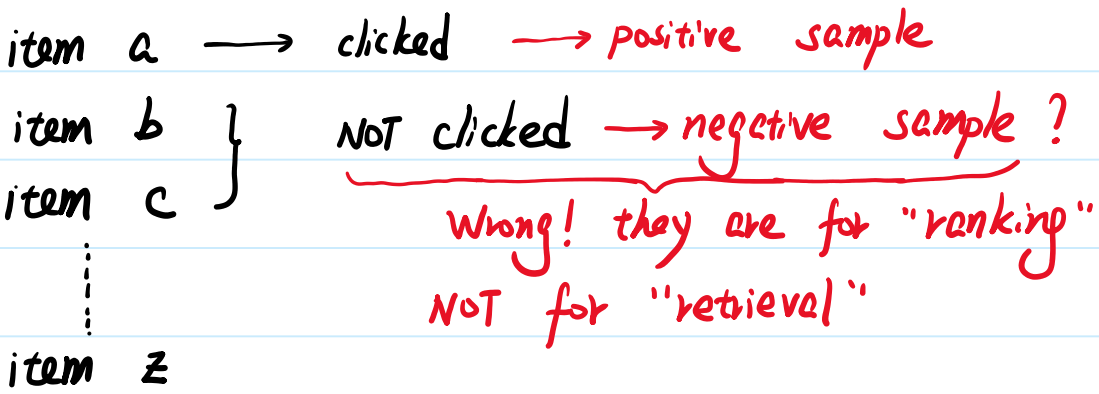
Wrong Negative Samples:

use items exposed to users but NOT clicked.



All items (easy): most of them NOT liked by the user

items left out by ranking (hard): liked by user but not much

Exposed but NOT clicked (useless for retrieval): very like