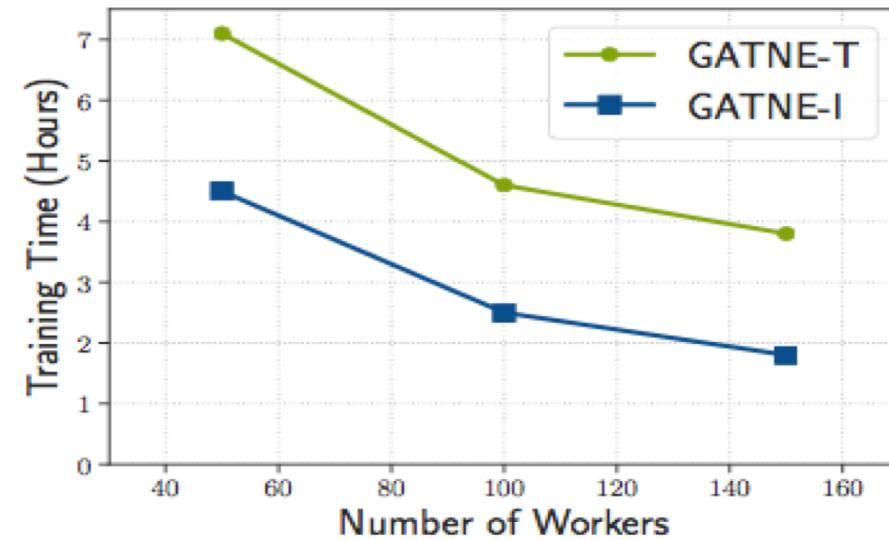
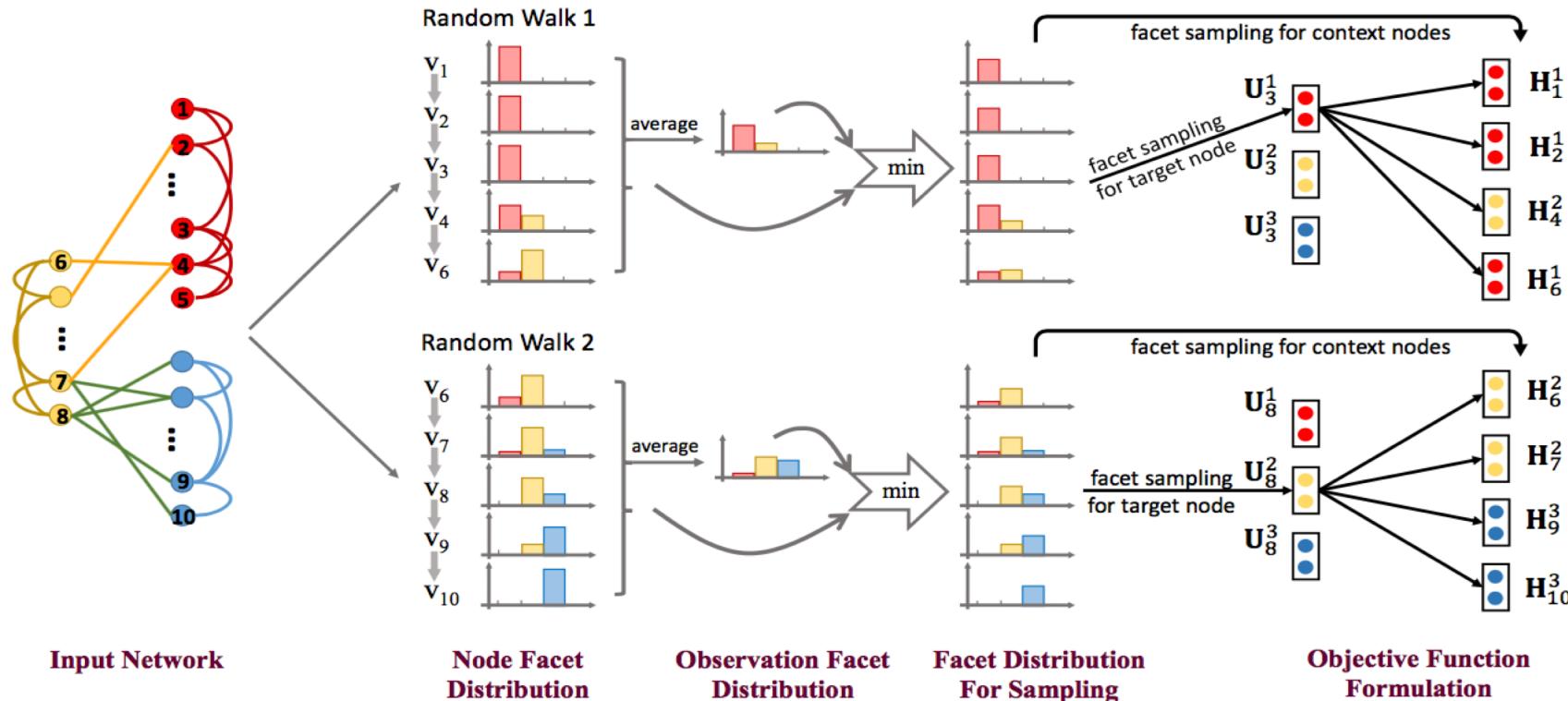


(a) Convergence



(b) Scalability

Figure 3: (a) The convergence curve for GATNE-T and GATNE-I models on A+ dataset. The inductive model converges faster and achieves better performance than the transductive model. (b) The training time decreases as the number of workers increases. GATNE-I takes less training time to converge compared with GATNE-T.



$$p(o|s(o), \mathcal{P}, \theta) = \prod_{v_j \in N(v_i)} p(v_j|v_i, s(o)),$$

and each product factor is calculated as

$$p(v_j|v_i, s(o)) = \frac{\exp(\langle \mathbf{H}_j^{k_j}, \mathbf{U}_i^{k_i} \rangle)}{\sum_{v,k} \exp(\langle \mathbf{H}_v^k, \mathbf{U}_i^{k_i} \rangle)},$$

Hierarchical GNN

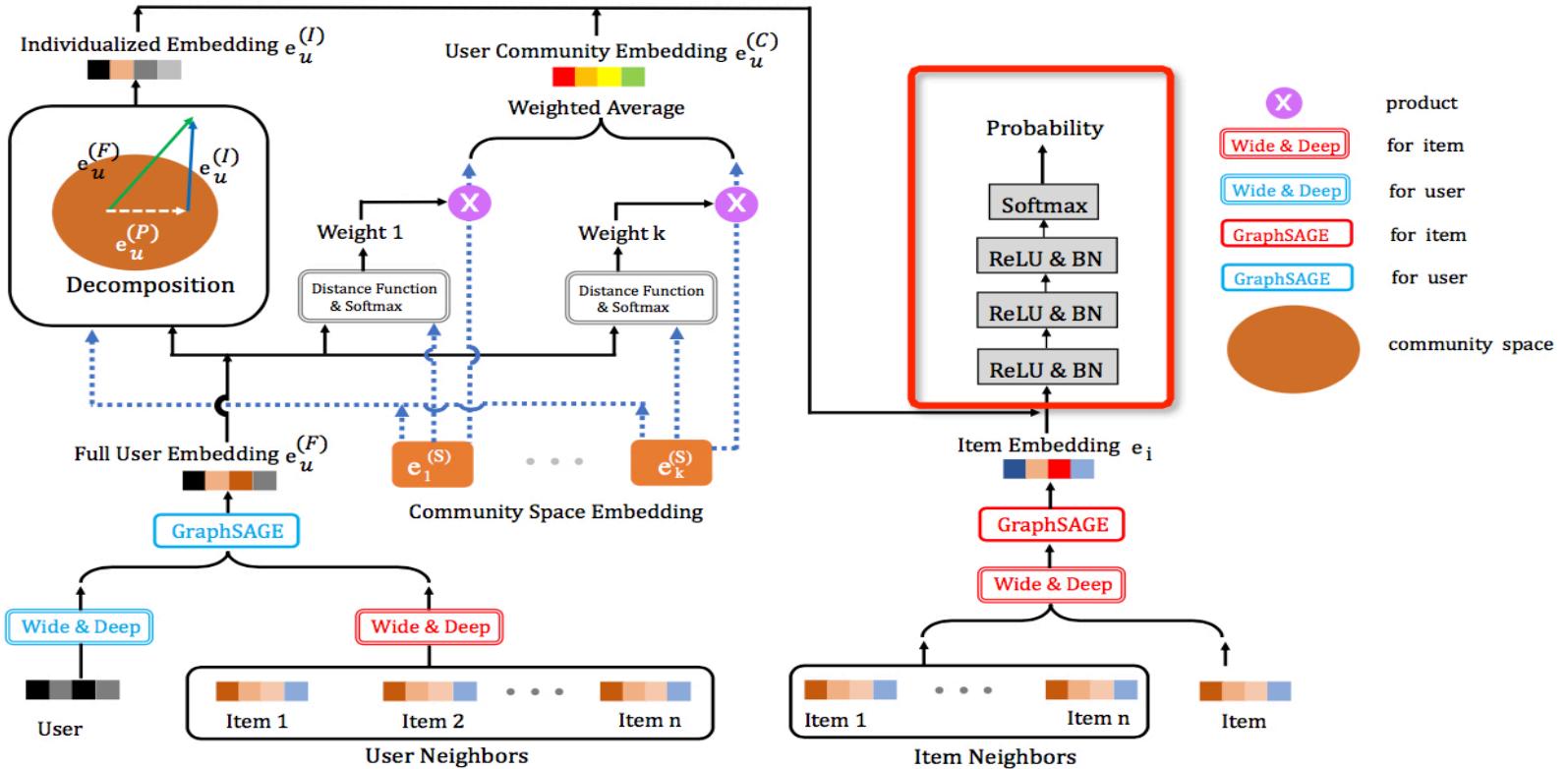


Figure 2: Framework of *Bi-HGNN*. Left side outputs *user-community* and *individualized* embeddings. Since user and item raw features are generally sparse, wide and deep is used here for feature encoding. Based on the user's historical behaviors, n items are selected as his/her neighbors to generate *full* user embedding with GraphSAGE. *User-community* embedding is derived through weighted average over users that belong to the specific community, where weight is determined by the distance between the user and *base community* embedding. *Full* embedding is decomposed into *user-community* and *individualized* embeddings, which is illustrated in the upper left of the figure within the dashed square. Right part represents the item embedding generation. With both the user and item embeddings, the classifier undergoes several fully connected neural networks and outputs a probability to determine whether to recommend the item to the user.

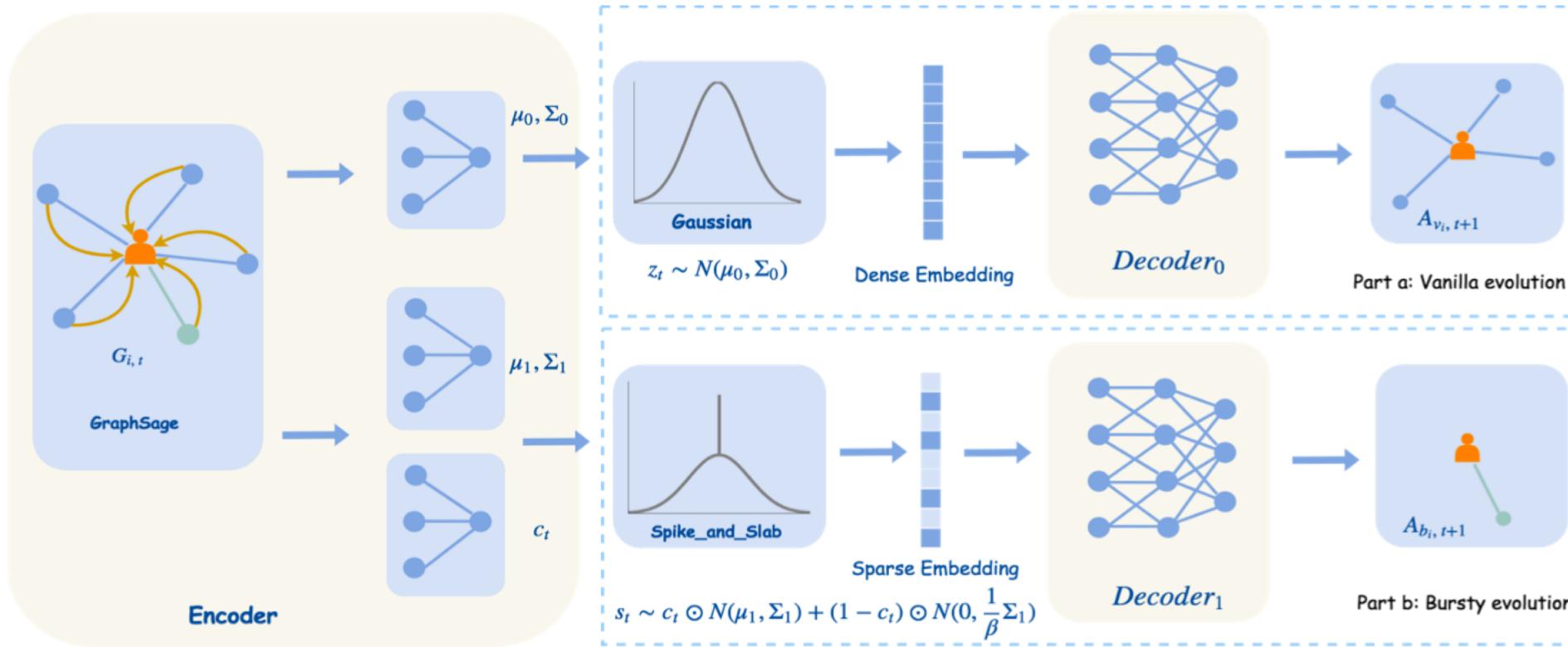


Figure 2: An illustration of the proposed framework *BurstGraph*. At time step t , the framework generates vanilla evolution and bursty evolution based on network structure G_t . Part a is an original VAE for vanilla evolution, where random variable z_t follows a Gaussian distribution. Part b is an extended VAE for bursty evolution, where random variable s_t follows a spike-and-slab distribution because of the sparsity of bursty links. The encoder for these two random variables z_t and s_t shares the same GraphSAGE to utilize the information from vertices and their neighbors.

- BEM is proposed to bridge KG and BG seamlessly, with the consideration of the behavior-specific bias. This framework provides a new perspective of making a reasoning mechanism (cognitive graph).
- As a method, BEM is generic and flexible in that it can use any KG embeddings to correct any BG embeddings. On the contrary, it is potentially able to help KG embeddings acquire novel knowledge from the BG embeddings that does not exist in the knowledge graph.

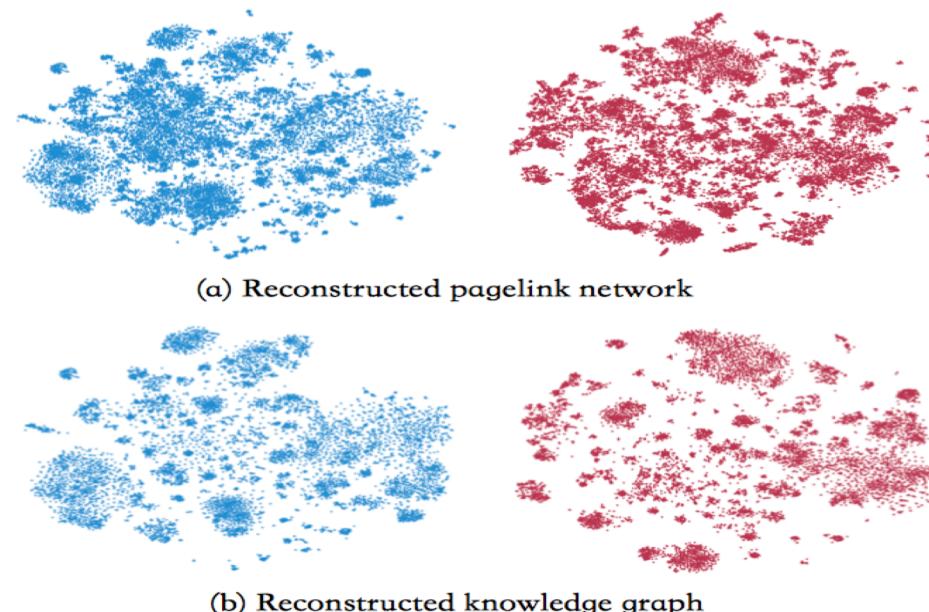


Figure 4: Reconstructed vertex graphs. The blue ones are original graphs and red ones are corrected graphs.

Supported Algorithms



Algorithms Proposed

Algorithm	Heterogeneous		Attributed	Dynamic	Large-Scale
	Node	Edge			
HEP	✓	✓	✓	✗	✗
AHEP	✓	✓	✓	✗	✓
GATNE	✓	✓	✓	✗	✓
Mixture GNN	✓	✓	✓	✗	✗
Hierarchical GNN	✓	✓	✓	✗	✗
Bayesian GNN	✗	✓	✓	✗	✗
Evolving GNN	✗	✓	✓	✓	✗

Part 5 : Current Focus in Practice

Search-Recommendation Platform



Business Solution

Search/Recommendation/
Ads

Business
Intelligent

Fraud Detection/
Risk Control

ID Mapping and
Profile

Crowd
Marketing

Service

Index/Rank

Training/Inference

Evolutional/Online
updating

AutoML

Transfer Learning/
Reinforcement
Learning

AI Algorithm

Natural
Language
Understanding

Image
Processing

Video
Processing

Machine
Learning/
Deep Learning

Cognitive Graph

Data

Global User
Profile

Global Seller
Profile

Online Offline
Info Integration

Ecommerce
Cognitive Graph

Business
Operation
Knowledge

System

Distributed
Computing

Stream
Computing

Graph
Computing

Online Learning and
Inference

Heterogeneous
Computing

Cloud Theme

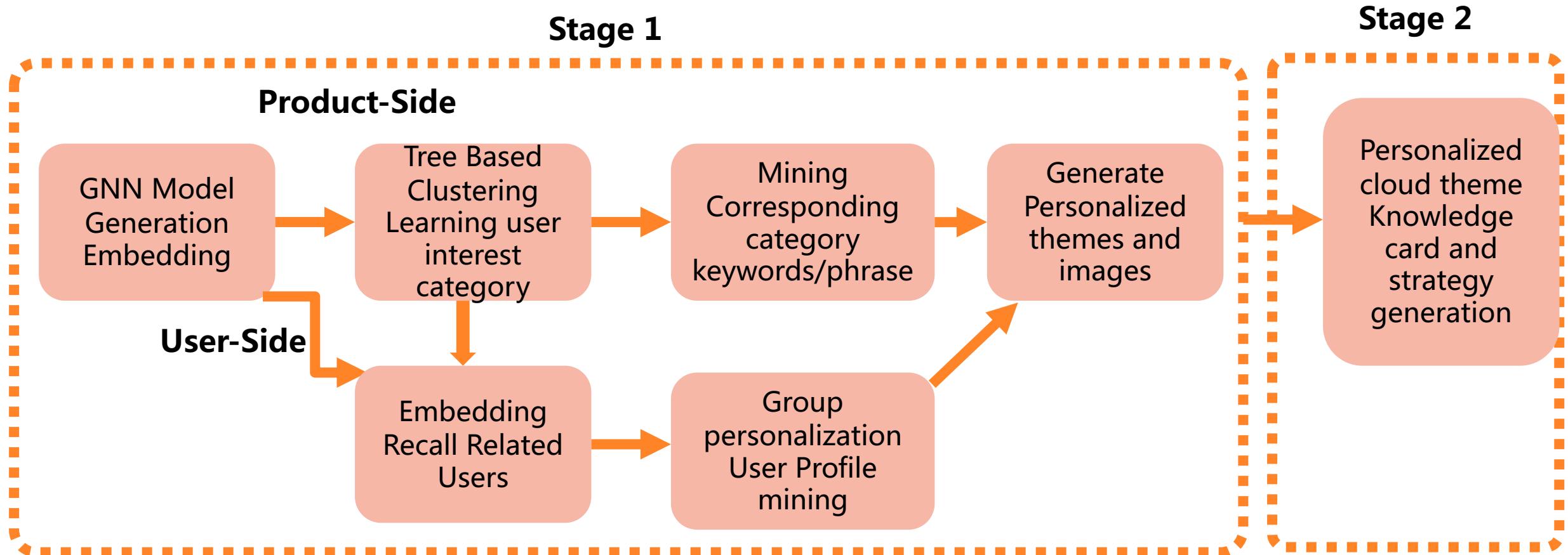


from Single Product Recommendation to Group Meet Place、cultivate metal upgrade

Meeting Place for Personalized Groups

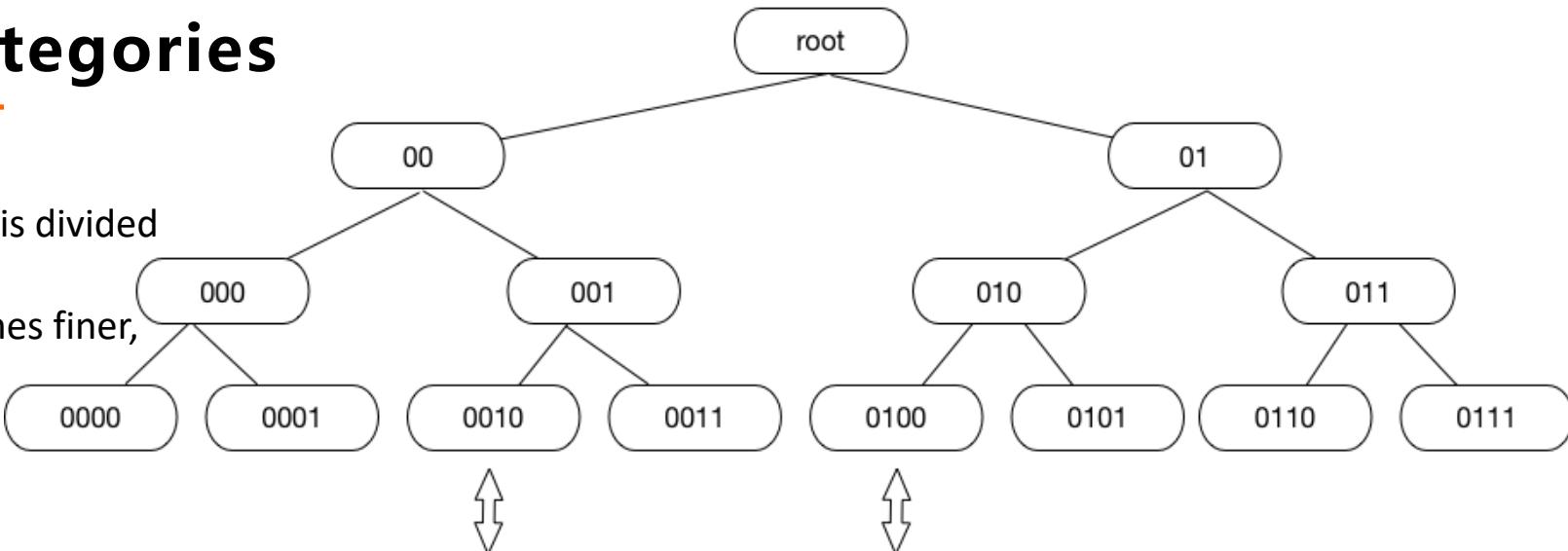


Cloud Theme The Flow



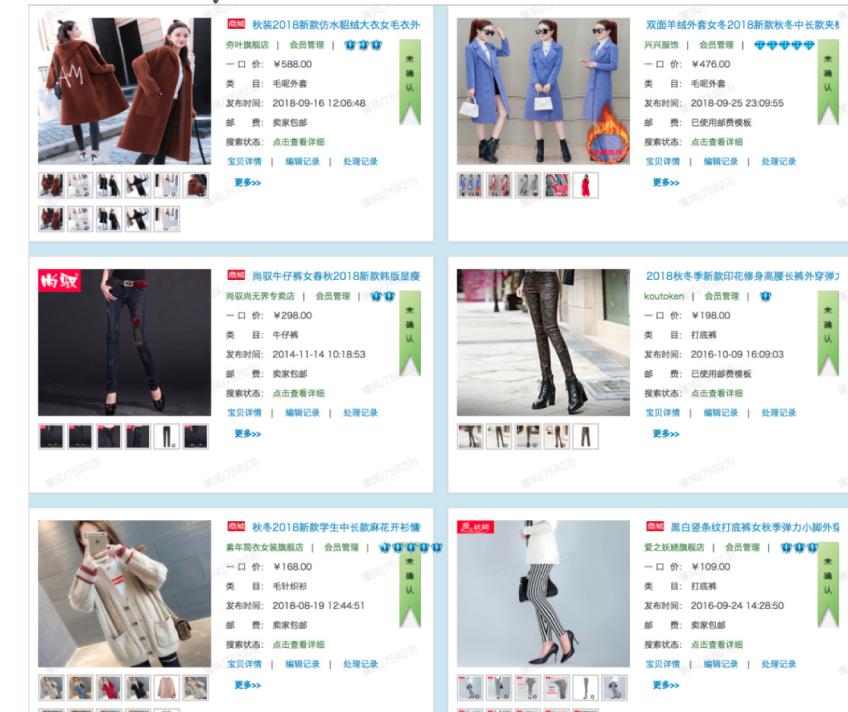
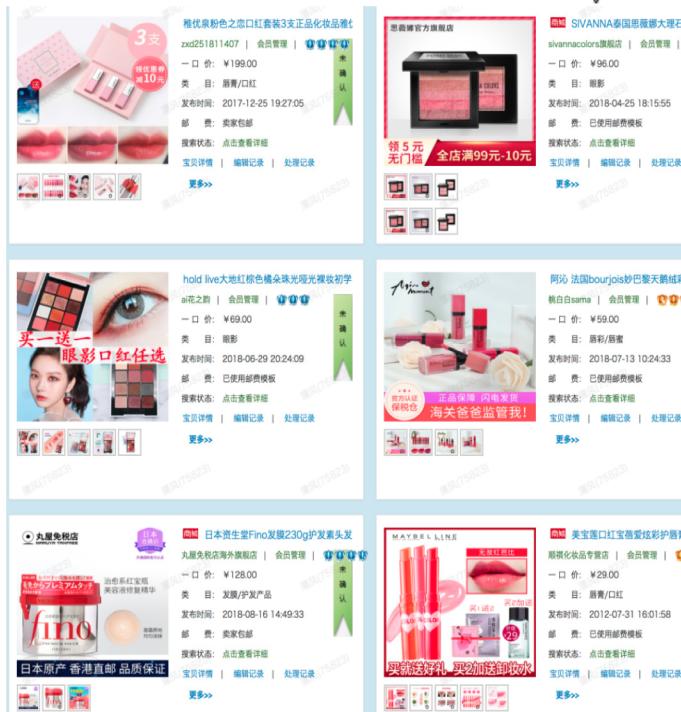
User Interest Categories

1. GCN Model generate embedding
2. Hierarchical clustering, each layer is divided
3. As the number of layers deepens,
the granularity of the division becomes finer,
and the semantics gradually emerge



Commodity Aggregation

Lipstick
Eye shadow
Lip gloss
Hair mask



Woolen coat
jeans
Leggings Wool
sweater

Cloud Theme Title Auto-Generation



Now:

1. thousands of online cloud themes, mostly manual verification, many unmaintained
2. The main and subtitles of the cloud theme are too plain to attract users to click



Future:

1. Automatically generate cloud topics through algorithms, produce them in batches by algorithms, and automatically iteratively optimize.
2. Learn to produce scene-oriented, attractive main and subtitles.

ex:

1st cloud theme

Main Title: The coolest "digital" baby
Subtitle: Immersive game experience

2nd cloud theme

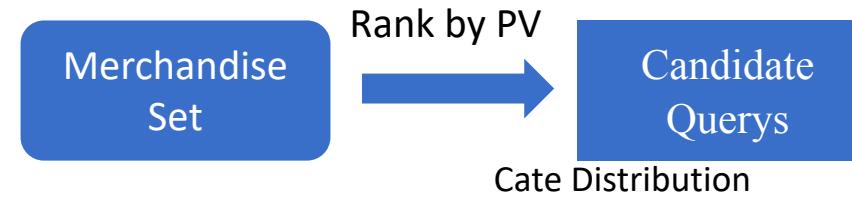
Main Title: Baby winter Heater
Subtitle: Provide warm sleep for your baby

Cloud Theme Title Auto-Generation



Method1: retrieval model

Civic 10th gen modification
Civic Modification
Angkerra Modification
Fit modification
.....

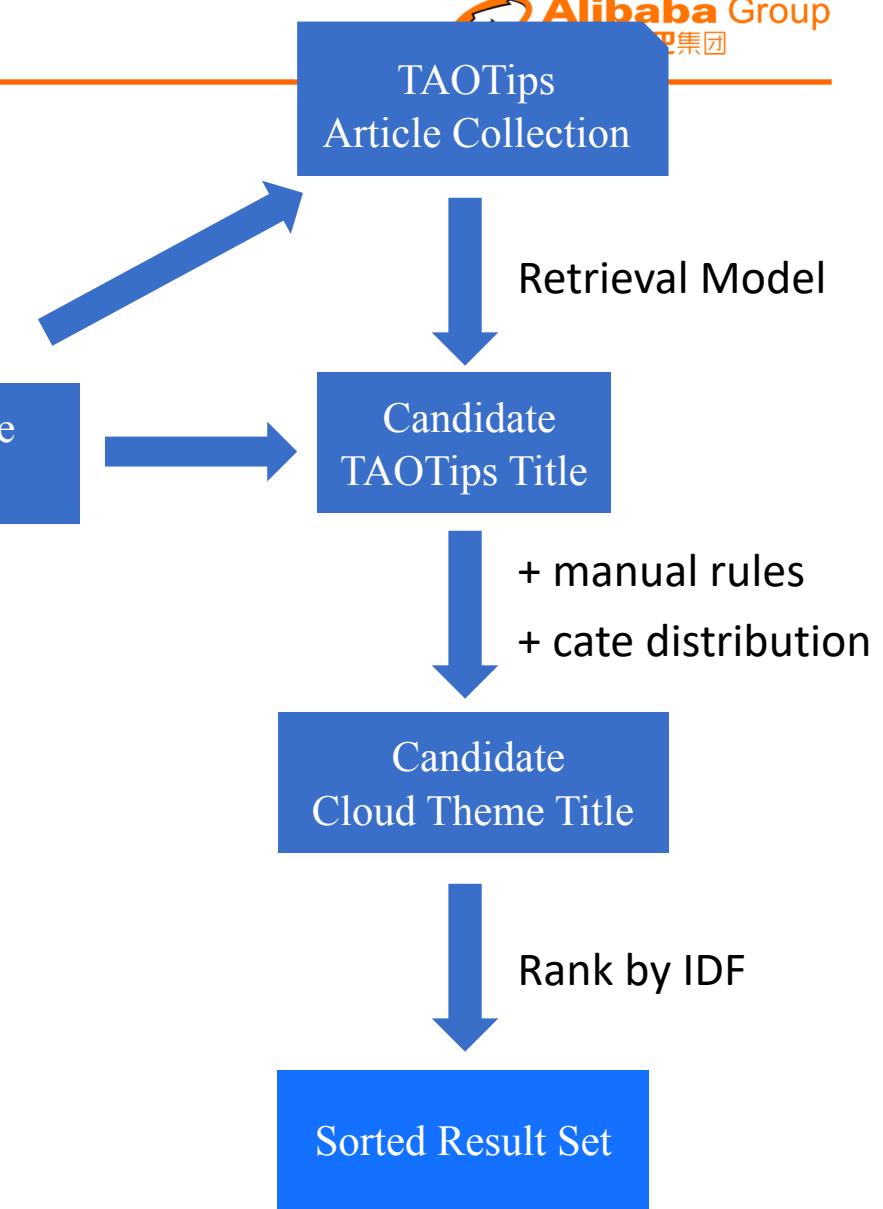


Appearance of 10th-gen Civic is modified to make it even more exciting.
The new Civic changes, turn your car into a wild horse.
Nothing is born perfect, a Civic modified car fits you.
The new Civic is modified to play a high-powered style.
The 205-horsepower grocery shopping car, the Civic is so handsome.
Upgrade the Civic to create a savage calf.
.....

0.5712
0.5845
0.4561
0.3381
0.4324
0.5325
.....

IDF Values

Turn your car into a wild horse	0.4532
Make the car more exciting	0.3312
Nothing is born perfect	0.2545
create a savage calf	0.1124
.....



Cloud Theme Title Auto-Generation



	Main Title	SubTitle	Category
1	序列	主标题	副标题
1019	101010011	你的装嫩神器	完美发挥显示器的性能
1020	101010011	让你一步到位	笔记本玩游戏不方便
1021	101010011	真正的桌面PC	身临其境的游戏体验
146	110000	让宝宝有趣味的玩耍	夏天也可以用的尿不湿
147	110000	给宝宝更舒适体验	婴儿的天然健康保护伞
148	110000	宝宝冬季的小暖炉	为宝宝提供温暖的睡眠

Baby's small heater in winter

Provide warm sleep for your baby

Cloud Theme Title Auto-Generation

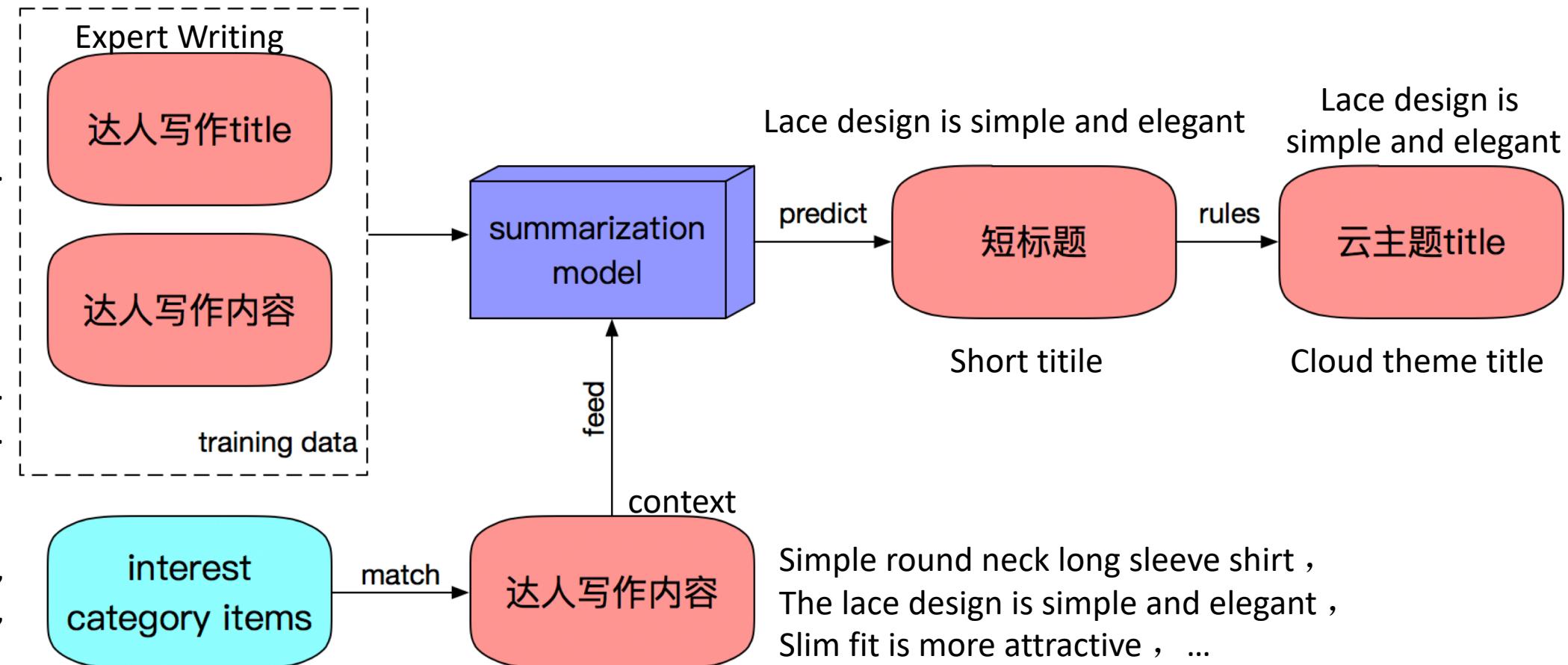


Method2: generative model

卸下校服，轻...
Get这些厨具...
含绒量超高...
脚暖身体才能热...
...

很多MM在六月...
越来越多的男生...
羽绒服作为冬季...
冬天出门会忘记...
...

579845811167,
575858885796,
...

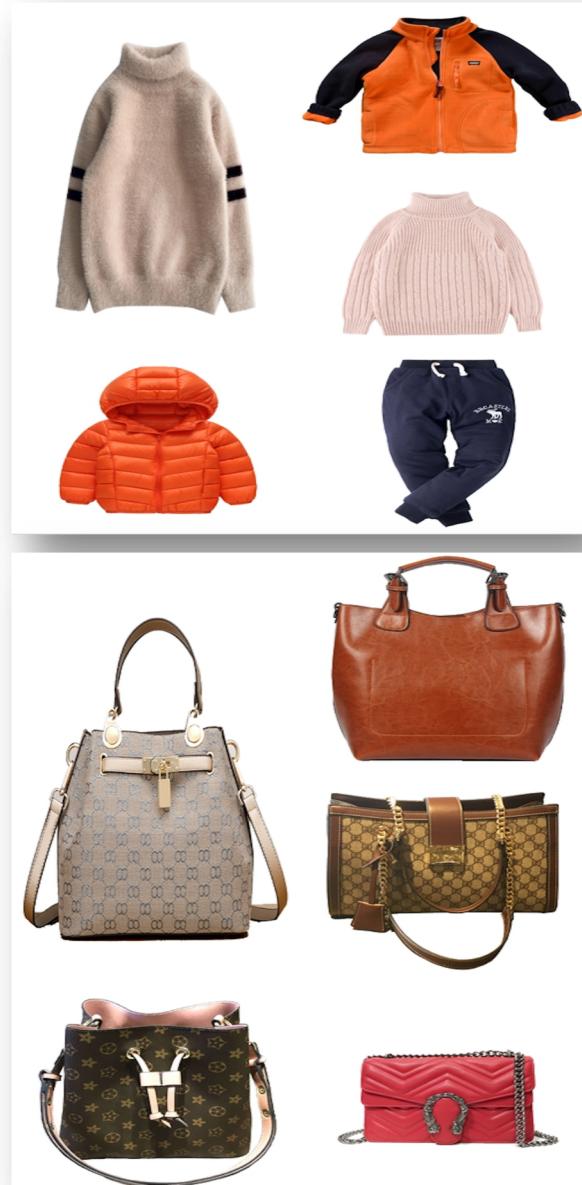
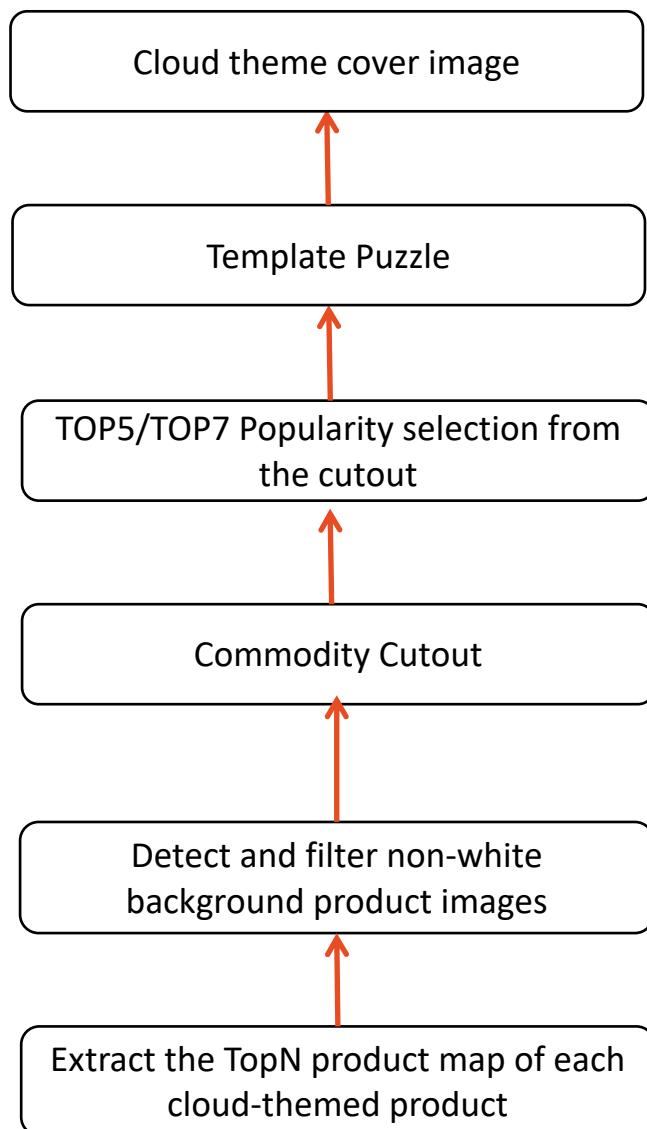


Cloud Theme Title Auto-Generation



1	description	生成title
2	简约圆领长袖衬衫，蕾丝设计简约且优雅，修身的版型更为动人，3D印花更为休闲，很有文艺感。	蕾丝设计简约且优雅
3	眼下，外观小巧精美，看起来“萌萌哒”的多肉植物越来越受到养花爱好者喜爱，春天正是捣鼓这些可爱小植物的最佳时节。	多肉植物，给你最好的爱
4	袜子对于注重细节的女生来说很重要，不仅能让双脚得到细腻的呵护，还能通过个性搭配，穿出不一样的时尚新潮，助你秒杀路人甲乙丙丁，所以在众多的时尚单品中，袜子是你绝对不容忽视的女神标配哦~	袜子也要潮，穿出时尚新高度
5	白色是夏日里最常见的颜色，简约大气的白色非常百搭，让人看起来十分清爽，全白搭配亮眼又够chic，搭配亮色服饰穿，非常抢眼，助你轻松成为街头焦点！	简约白色，助你轻松成为街头焦点
6	不管是女生男生，每天都要摄取一定量的水是对身体有好处的，有一款心仪的杯子，连喝水都变成了一件开心的事情了，形形色色的杯子是不是都让你挑花了眼，小编给大家挑选了一些好看好用的杯子咯~	高颜值水杯，喝水也要萌萌哒
7	如果想穿得时尚又保暖，而且还很有型毛呢大衣当属明智之选，最容易穿出优雅气质来。穿上它，平淡中体现了一丝温馨和华贵，只要一件就能轻松抢尽眼球，让你成为寒风中暖融融的新淑女吧！	穿上毛呢大衣，暖融融的新淑女
8	很多男生可能觉得剃须这件事可是一件烦心的小事，没必要浪费时间。但马云建议大家找一个阳光明媚的周末，尝试一次从洁面、护理、上油、剃须、保养一条龙的剃须体验，我想你会因此爱上高大上的自己	让你高大上的剃须体验
9	炎炎夏日，小清新们的福利又来了，这么美的你怎么少得了仙气爆棚的连衣裙？无论是文艺复古系长裙还是元气满满的短裙，搭配着简单的碎花或者结合民族风，都有着独特的情调，所以说小清新连衣裙是永不过时的美衣，选对连衣裙，怎么搭配都美。	小清新连衣裙，怎么搭配都美
10	奥黛丽赫本曾经说过：“不涂口红的女人没有未来”。由此可见，口红对于女人来说是至关重要的。而口红囤积症是许多女孩的共有病症，大牌买多了钱包又受不了，其实很多口红平价又好用，不输大牌噢。	平价又好用，不输大牌的平价好物
11	非常经典的一款针织衫，船型领口的设计，显露出锁骨与脖颈曲线，修饰肩膀比例，凸显气质。流行的落肩，蝙蝠袖的宽松，任何身形都可以轻松驾驭。拼接不规则的多边形图案，特殊的面料更显个性。羊毛混纺针织面料，不易变形。	时尚百搭的针织毛衣
12	逢年过节总想给父母送点什么来聊表孝心，来补偿自己经常在外工作不能陪伴父母，但是很多时候送的礼物却有点鸡肋了。想不出送什么可以试试送一些比较实用的家电来分担家中家务的压力，让父母生活更舒心。	实用家电，送爸妈更省心

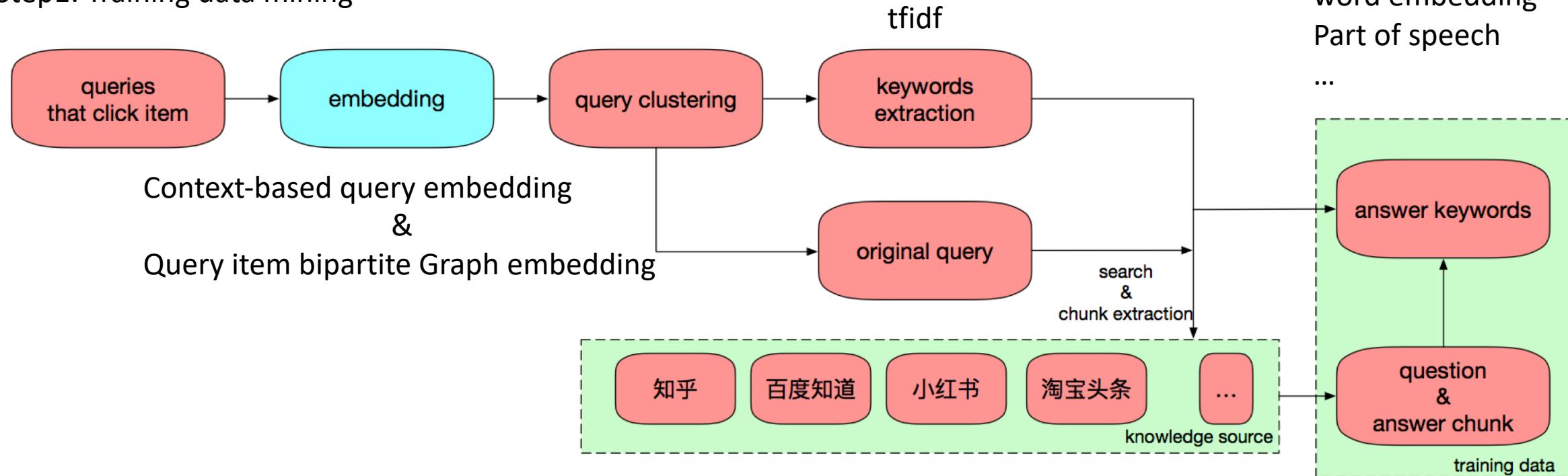
Cloud Theme Main Image Auto-Generation



Cloud Theme Knowledge Card/Guide Generation



Step1: Training data mining



Cloud Theme Knowledge Card/Guide Generation



Knitwear category: Query clustering result display

