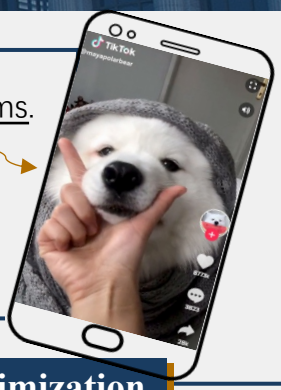
Content Promotion for Online Content Platforms with the Diffusion Effect

1. Introduction

Content promotion policy plays a prominent role in online content platforms.
We study the **diffusion-based promotion strategy.** Such as TikTok



Content clicks come from { Direct platform promotion
Diffusion effect from other users (usually ignored in previous literature)

2. Diffusion Model

Our model is adapted from **Bass Diffusion Model**

p : promotional coef.
q: diffusion coef.
m: market share

Promotion prob. # of cumulative adopters

$$a_t = p(m - A_{t-1})x_t + \frac{q}{m}A_{t-1}(m - A_{t-1})$$

New Innovators
Adopters targeted by promotion

New Imitators
Adopters not targeted by promotion

3. Promotion Optimization

Objective: Maximize the total adoptions.
Two-stage Decision
(1) Candidate set V + (2) Promotion prob. $\boldsymbol{x}$

(1)

$$\max_{V\subseteq\mathcal{V}:|V|\leq K}$$

(2) embed diffusion

$$\max_{\mathbf{0}\leq\boldsymbol{x}\leq\mathbf{1}} \sum_{v\in V} A_{v,L}(x_v)$$
$$\text{s.t.} \sum_{v\in V} x_v = 1$$

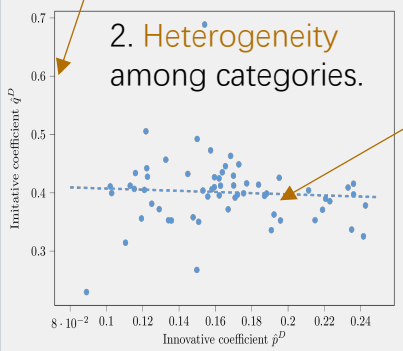
Submodular: adaptive greedy algorithm

4. Experiment Results from a Large-scale Video Sharing Platform

Dataset: one of the largest video-sharing platforms in China.
46,444 short videos; **518,646** users; **20** days (7/1/2020-7/20/2020).

Diffusion power of online videos

1. Significantly stronger innovative effect than the consumer products.



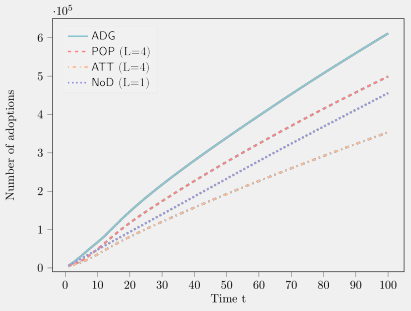
Distribution of estimated parameters p and q

3. Slight negative correlation between p and q.

Non-triviality of the promotion problem

Performance of Adaptive Greedy Algorithm

Common benchmarks in industry:
Candidate by popularity (POP) **+22.48%**
Candidate by attractiveness (ATT) **+72.86%**
Promotion without diffusion (NoD) **+34.14%**



Algorithm performance compared with benchmarks