Full Paper 3225

DVR: Micro-Video Recommendation Optimizing Watch-Time-Gain under Duration Bias

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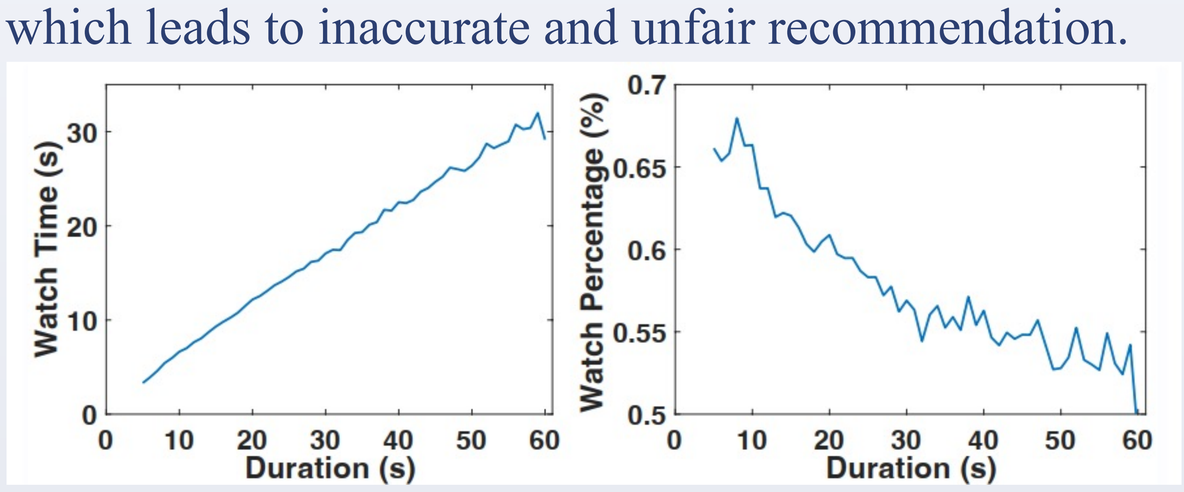
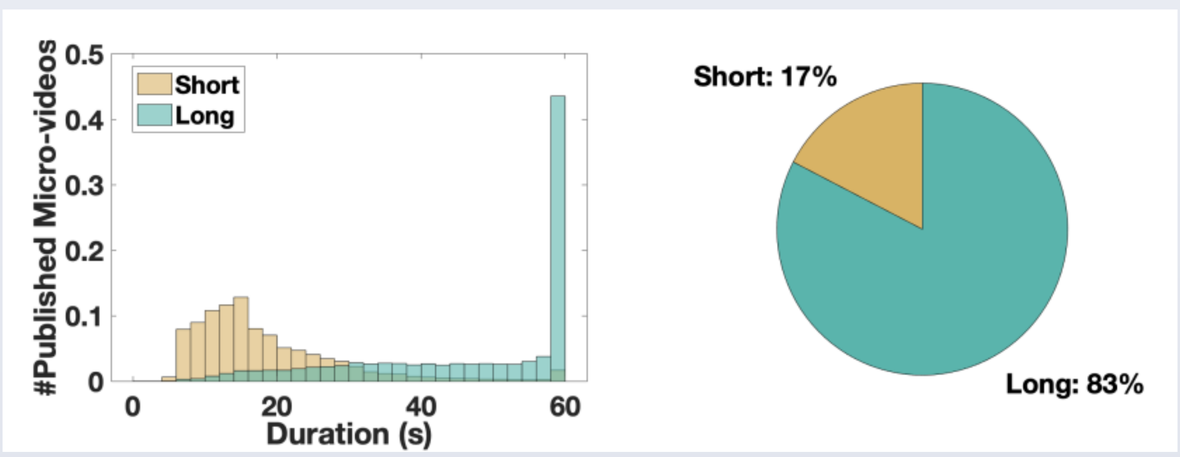
ACM Multimedia 2022
Lisbon, Portugal | 10-14 October

Introduction

■ Duration Bias

Watch time/percentage is commonly adopted as the prediction target of recommendation model. However, it is **biased** towards videos with long/short duration, which leads to inaccurate and unfair recommendation.





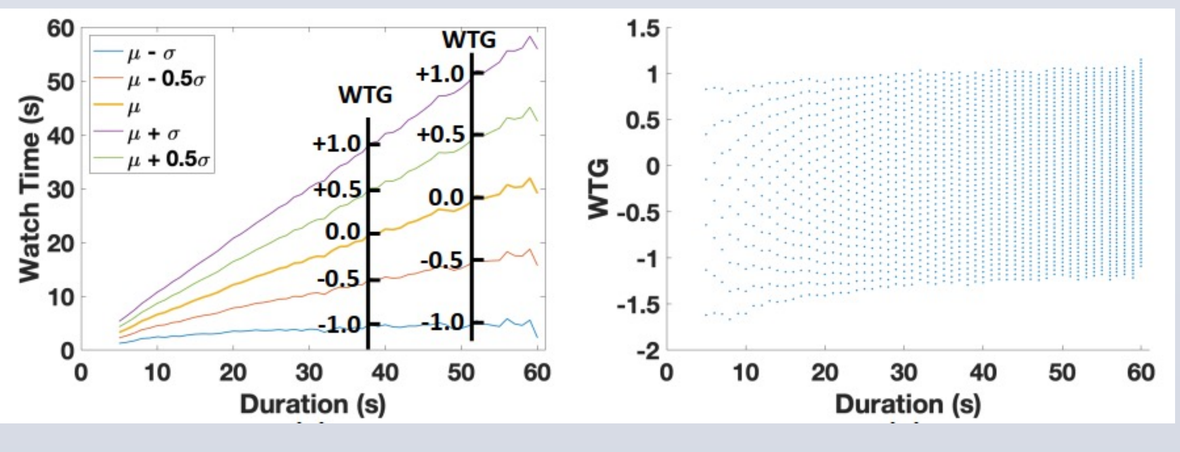
Method

■ Watch-Time-Gain (WTG)

An unbiased metric for micro-video recommendation.

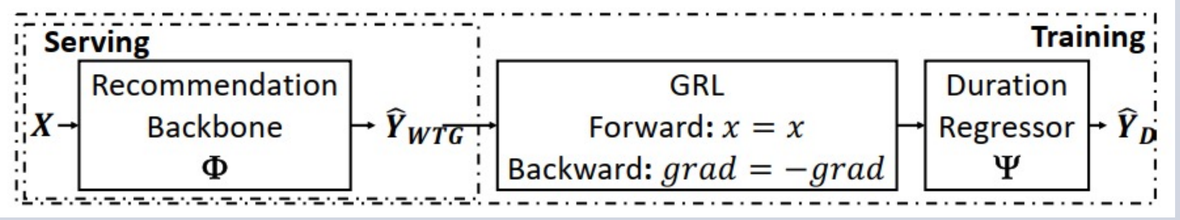
$$\mathbf{B} = [b_1, \cdots, b_m],$$
$$B(v) = f_b(d_v),$$

$$\mathbf{WTG} = \frac{\mathbf{WT} - \mu_{B(v)}}{\sigma_{B(v)}},$$



■ Debiased Video Recommendation (DVR)

An unbiased learning framework.



Three special designs on alleviating duration bias:

- Input: **d**elete **d**uration from input features (DD)
- Output: use **WTG** as prediction target (WTG)
- Model: **adv**ersarial learning (ADV)

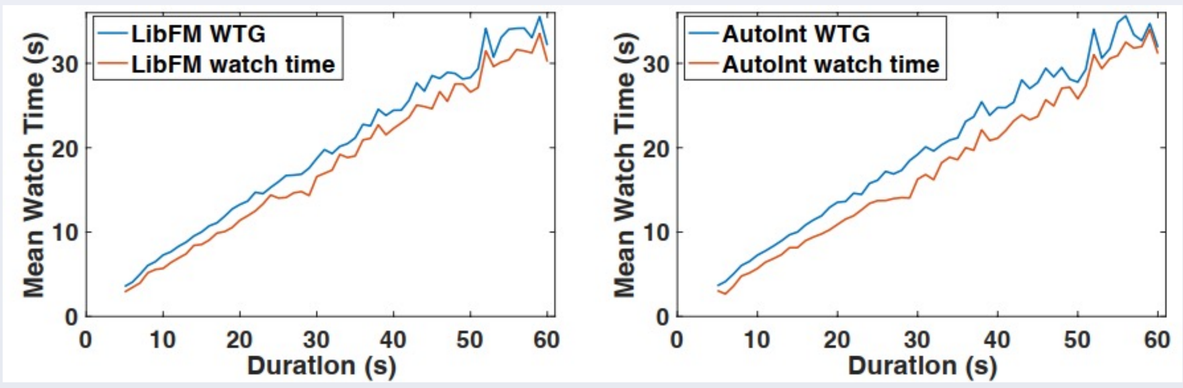
Experiments

■ Datasets

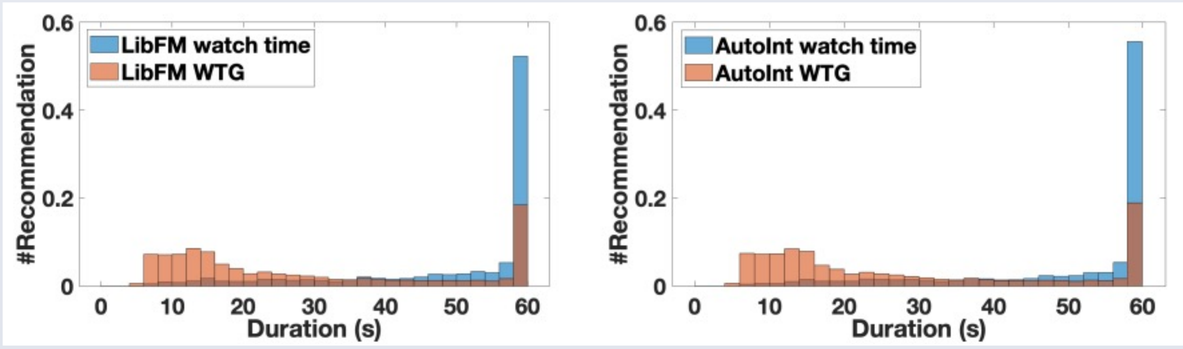
Two of the largest micro-video platforms in China.

Dataset	#Users	#Videos	#Records	Total Duration (s)
Wechat	10,000	639,557	2,672,809	46,785,442
Kuaishou	20,000	96,418	7,310,108	227,955,046

■ Effectiveness of WTG



WTG is more accurate than watch time.



WTG is more fair than watch time.

■ Effectiveness of DVR

Method Backbone	Debias	Wechat WTG@10	Wechat DCWTG@10	Wechat #BC@10	Kuaishou WTG@10	Kuaishou DCWTG@10	Kuaishou #BC@10
FM	None	0.0209	0.2985	6381	0.0571	0.4178	5854
	DVR-	0.1249	1.3813	5994	0.1662	1.1318	5728
	DVR	**0.1332**	**1.5100**	**5947**	**0.2094**	**1.6137**	**5240**
WDL	None	0.0265	0.3880	6326	0.0532	0.4031	5851
	DVR-	0.1342	1.4683	5926	0.2002	1.4810	5511
	DVR	**0.1468**	**1.6539**	**5881**	**0.2087**	**1.5833**	**5226**
DeepFM	None	0.0236	0.3648	6345	0.0550	0.4161	5843
	DVR-	0.1372	1.5086	5894	**0.2132**	1.5664	5426
	DVR	**0.1469**	**1.6551**	**5866**	0.2066	**1.5902**	**5261**
NFM	None	0.0234	0.3334	6345	0.0561	0.4478	5826
	DVR-	0.1302	1.4338	5952	**0.2089**	1.5632	5368
	DVR	**0.1444**	**1.6226**	**5899**	0.2081	**1.6050**	**5230**
AFM	None	0.0335	0.4028	6349	0.1052	0.7237	6337
	DVR-	0.1203	1.3318	5986	0.1260	0.8890	5726
	DVR	**0.1391**	**1.5656**	**5930**	**0.2082**	**1.6068**	**5209**
AutoInt	None	0.0272	0.3862	6330	0.0504	0.3823	5868
	DVR-	0.1351	1.4841	5924	**0.2124**	1.5561	5343
	DVR	**0.1458**	**1.6420**	**5874**	0.2086	**1.5905**	**5237**
AFN	None	0.0157	0.2599	6358	0.0536	0.4037	5832
	DVR-	0.1254	1.3714	6064	0.1691	1.2442	5552
	DVR	**0.1408**	**1.5858**	**5917**	**0.2015**	**1.5551**	**5229**

DVR brings steady improvements in all cases.

Dataset	Model	None	+DD	+WTG	+ADV
Wechat	NFM	0.3334	+8.59%	+354.28%	+386.68%
Kuaishou	AFN	0.4037	+49.08%	+267.39%	+285.21%

Three components all contributes to the improvements.

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