

LiveVideoStackCon

聚音视 研修不止于形

2017年10月20日-21日

北京·丽亭华苑酒店

LiveVideoStackCon

流媒体服务质量和用户体验优化

Hulu

Deliang Fu

- Hulu视频系统简介
- 流媒体服务质量和用户体验
- 流媒体服务质量优化与实践





Hulu视频系统简介

A **hulu** ORIGINAL

THE HANDMAID'S TALE

▶ Hulu的终端

- 多平台：Web端，移动端，电视端



▶ Hulu视频内容

- 点播+直播：电视、电影、自制剧、体育节目.....

The image is a collage of six promotional panels for Hulu content:

- New on Hulu:** Features the cast of *The Golden Girls* with the text "The Golden Girls are here! Entire series now streaming."
- Hulu Originals:** Features a scene from *The Path* with the text "Catch original series you won't find anywhere else like *The Path* starring Aaron Paul".
- Exclusives:** Features a scene from *Smallville* with the text "Watch Seasons 1-10 of *Smallville* exclusively on Hulu".
- Current-Season TV:** Features a scene from *This Is Us* with the text "Keep up with current seasons of today's most popular shows".
- Movies:** Features a scene from *Spectre* with the text "Find huge movies all the time".
- Kids:** Features the *Powerpuff Girls* with the text "Let the kids watch their favorites too".

Watermark text "Agave" and "I've been going off all night" is visible across the middle of the collage.

- 点播+直播：电视、电影、自制剧、体育节目.....



10 EMMY AWARDS
WINNER

INCLUDING

**OUTSTANDING
DRAMA SERIES**

- 注册用户 + 广告

hulu

Free One Month Trial • Step 1 of 3

Log In

Pick Your Plan

MOST POPULAR

Limited Commercials

Current episodes and full seasons of TV shows you love, with minimal interruptions.

Get One Month Free
then \$7.99/month

SELECT

No Commercials

Current episodes and full seasons of TV shows you love, with no interruptions.

Get One Month Free
then \$11.99/month

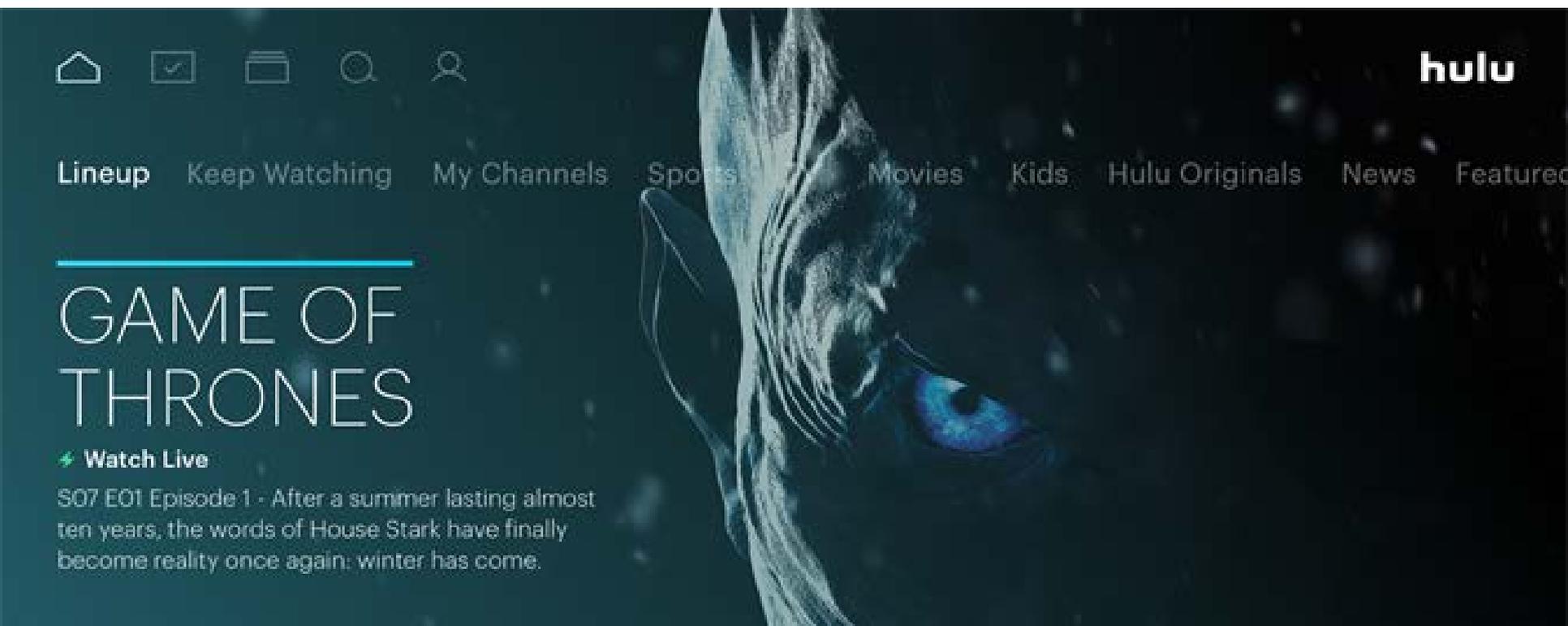
SELECT

Certain shows are not included in this No Commercials plan. [Click here](#) to learn more.

▶ Hulu 商业模式

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- 注册用户 + 广告



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流媒体服务质量和用 户体验

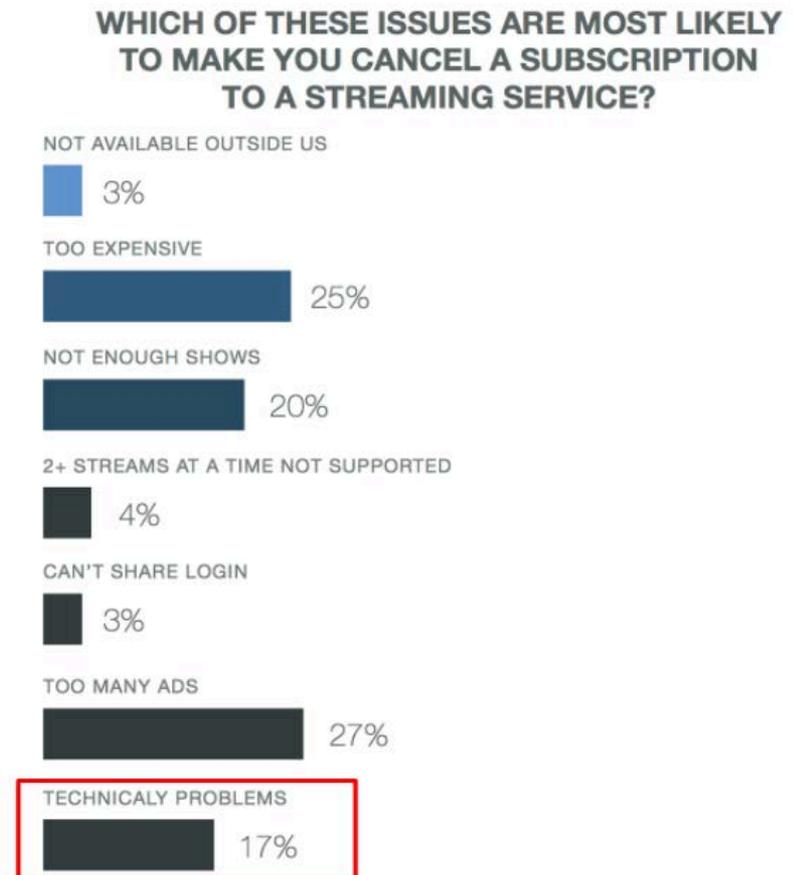
- 衡量音视频播放质量
- 主要维度：
 - 连续性
 - 卡顿、播放失败
 - 响应速度
 - 加载速度、seek延迟
 - 画面质量
 - 码率、分辨率

- 衡量用户对流媒体服务的满意度
- 常见指标
 - 观看时长
 - 观看视频数量
 - 视频观看完成度
 - 退订率



▶ 流媒体服务质量与用户体验 VideoStackCon

- 研究证明：流媒体服务质量可显著影响用户体验
 - 遇卡顿或缓慢启动时，66%用户会退出播放
 - 17%用户会因为服务质量问题退订流媒体服务
 - 严重卡顿会使得观看满意度从96.4降低至7.8（满分100）



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流媒体服务质量优化

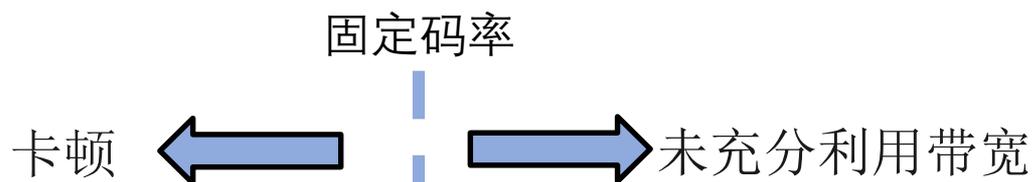
▶ 流媒体服务质量优化

- 码率自适应算法
- 流媒体服务质量优化挑战
- 流媒体服务质量优化实践

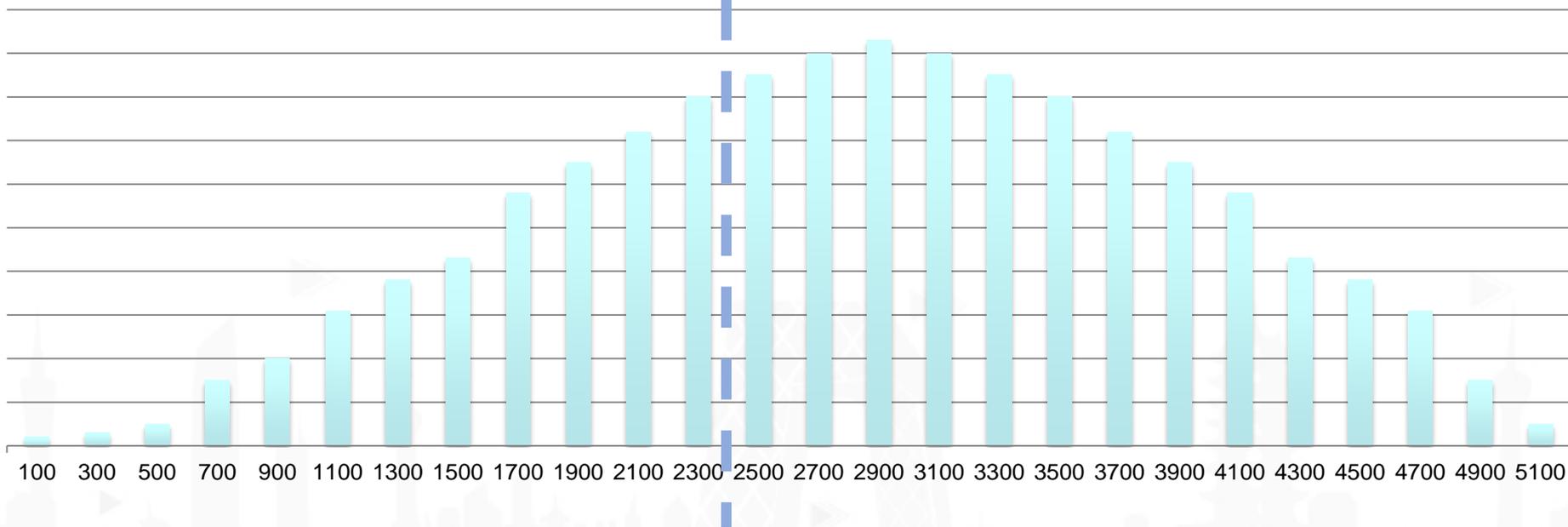


- 自适应视频传输
 - HLS
 - DASH
- 码率自适应调节算法
 - ABR / MBR (**A**daptive / **M**ultiple **B**itRate streaming)

码率自适应算法



用户带宽分布

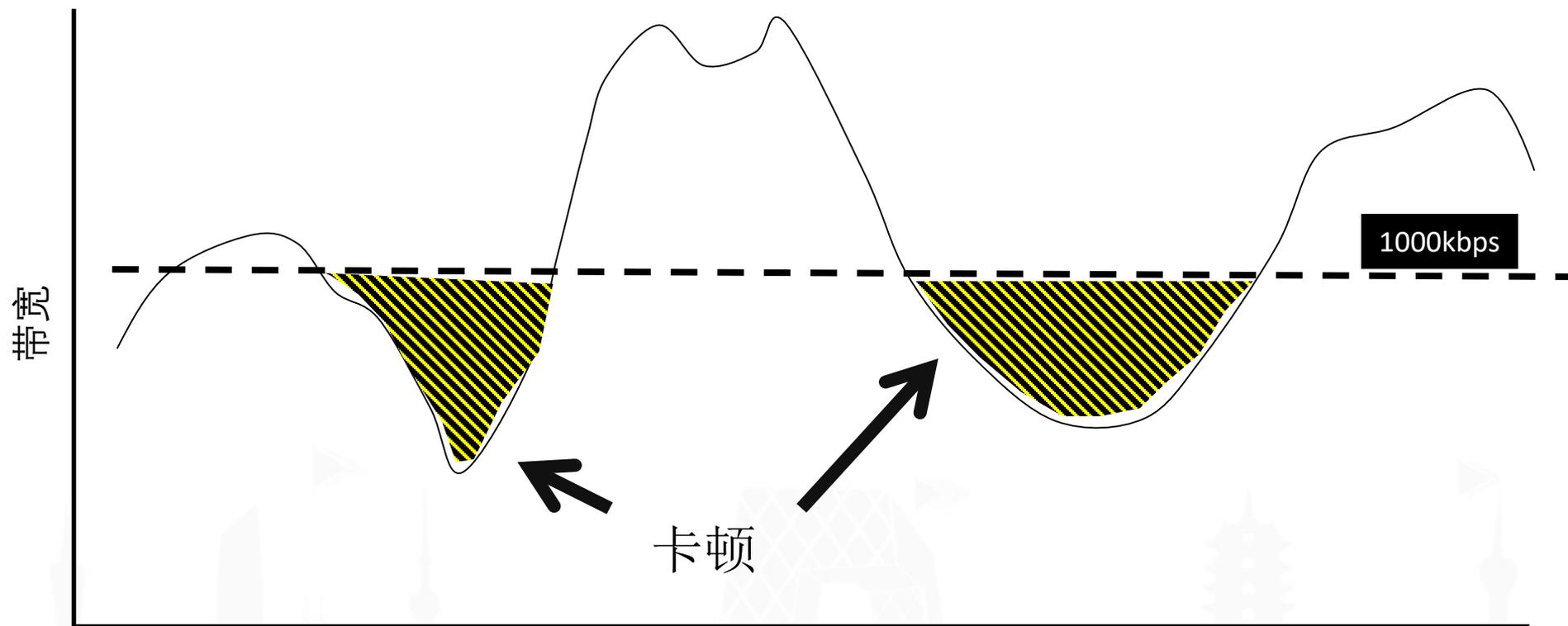


▶ 常见码率自适应算法

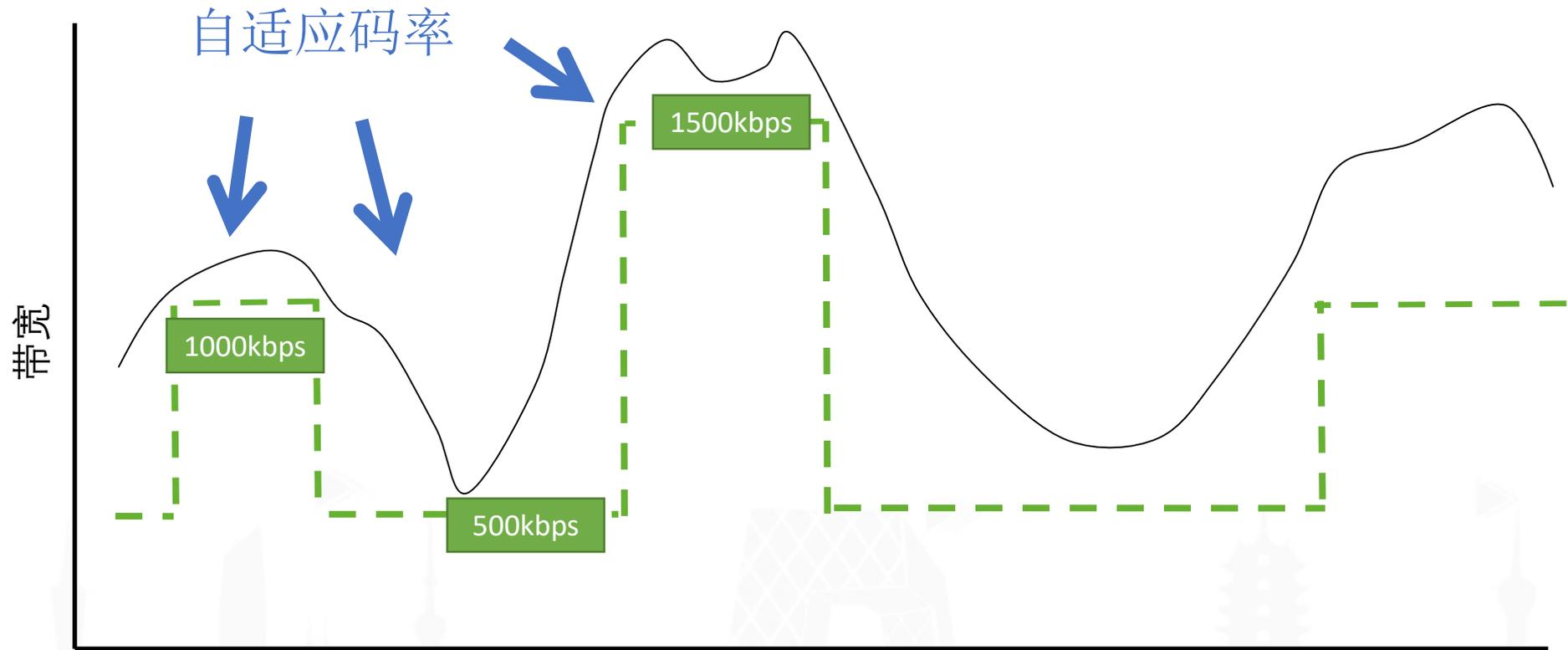
- 基于带宽估计的算法
- 基于缓冲大小的算法
- 混合算法



▶ 基于带宽估计的码率自适应



▶ 基于带宽估计的码率自适应



▶ 基于带宽估计的码率自适应

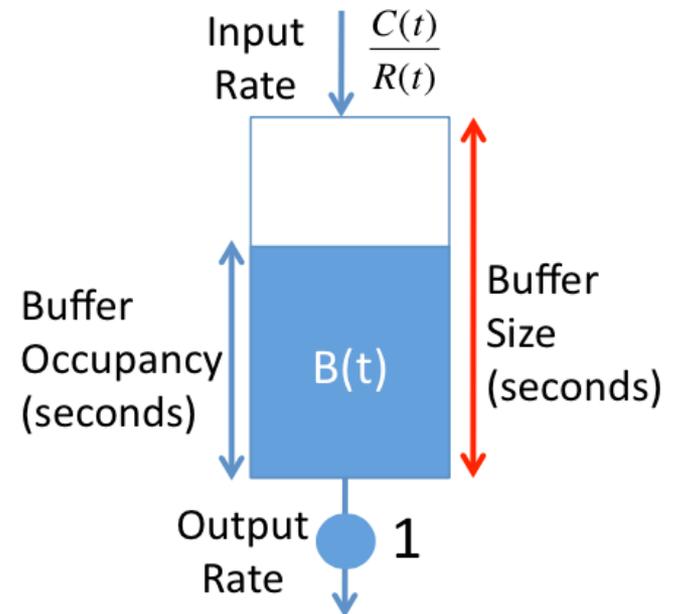
VideoStackCon

- 优势：
 - 逻辑简单直接
 - 参数较少，便于调整
- 挑战：
 - 带宽的准确实时估计



▶ 基于缓冲大小的码率自适应 by VideoStackCon

- 针对基于带宽估计算法的缺陷而开发
- 核心思路：将缓冲大小稳定在一定的范围
 - 当缓冲小于阈值，则选择更低的码率，反之亦然



▶ 基于缓冲大小的码率自适应 by VideoStackCon

- 优势：
 - 不需要带宽估计
 - 可较为稳定地充分利用带宽资源
- 挑战：
 - 参数较多，需要调试
 - 码率切换较为频繁
 - 在缓冲区较小的情况下不适用

- 结合运用带宽估计和缓冲区大小信息
- 可缓解两类算法各自的弱点
- 可针对业务需求对各项权重进行调整



▶ 流媒体服务质量优化的挑战

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- 数据规模大
- 线上数据噪声较大
- 影响用户体验的维度高



▶ 流媒体服务质量优化实践 LiveVideoStackCon

- 数据驱动
- 线下论证
- 线上实测



- 优化工作的起点
- 指明优化方向
- 提供增益估算



- 实现算法快速迭代
- 控制变量，降低随机干扰
- 避免影响线上用户



Hulu流媒体质量测试离线平台

- 变量控制实验环境
- 产品代码+真机离线测试
- 直观UI

PLOT

Experiments Setting

Session 711: Content ID (60231171) Player Version: 3 Session ID 92FEB418CF0A37AB99E974D2CE8EC72E

Hide Player Speed Hide System Speed Hide Player Buffer

Reload

MBR monitor
Built chart at 389ms

Zoom 1m 5m 10m 1h 2h All

From Jul 3, 2013 To Jul 3, 2013

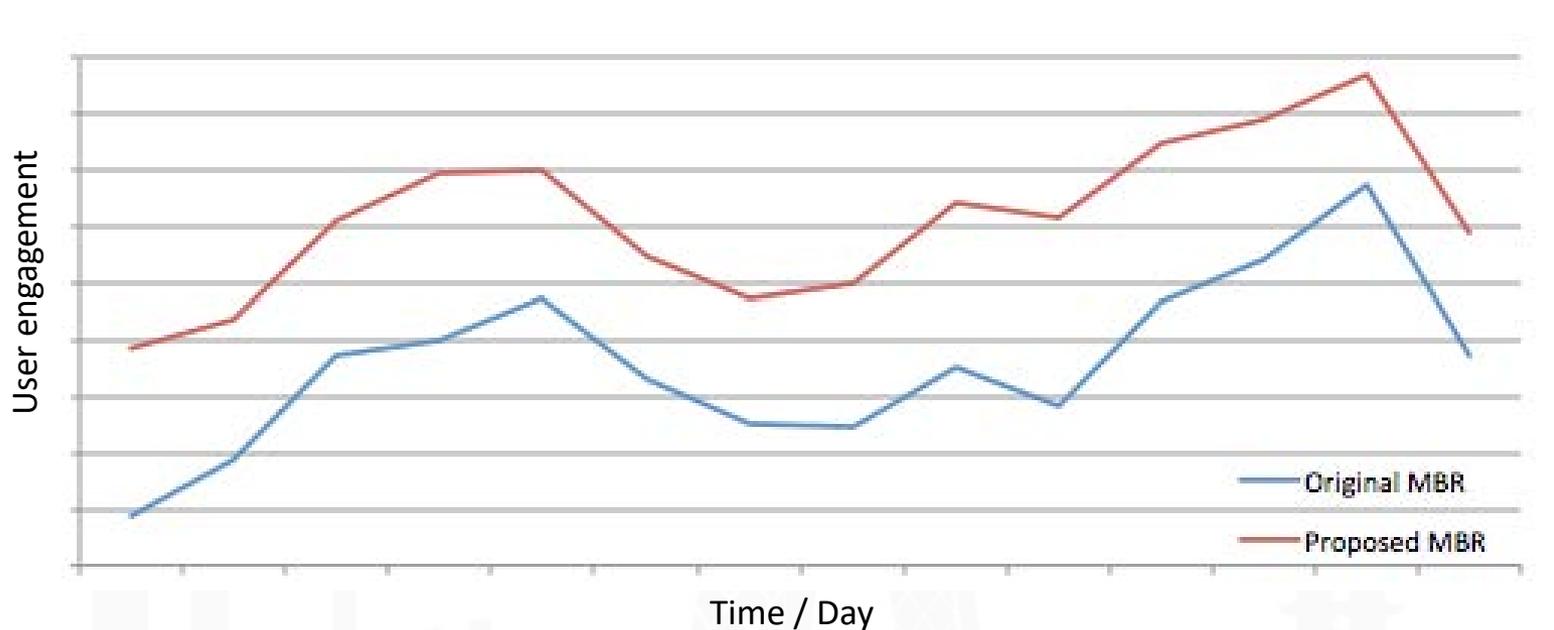


- 直接验证性能
- 获取用户体验数据
- 对数据分析与线下实验形成正向反馈



▶ 优化结果

- 成功对核心QoS指标进行优化
- 显著提高了用户满意度和粘性



Thank You

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关注LiveVideoStack公众号

回复 **傅德良** 为讲师评分