Where my AI apps at? A historiographic approach to analyzing platform tools

Abstract

TikTok is mainly discussed as a discrete app or in relation to its parent company ByteDance. This view neglects how TikTok and other ByteDance apps maintain and develop ByteDance's highly complex app ecosystem. This paper therefore positions ByteDance-owned apps as both apps and "platform tools." As a short-form video *app*, TikTok allows end-users to watch videos, creators to make and distribute content, advertisers to endorse products, and developers to build app features. As a *platform tool*, TikTok is a software-based resource that mediates "platformization," extending TikTok's economic, infrastructural, and governmental data-centric logic within and beyond ByteDance's app ecosystem. Increasingly ByteDance's platform tools rely heavily on AI technology because of ByteDance's early investments in AI and the growing interest in AI in the cultural industries. We therefore survey ByteDance's AI-powered platform tools alongside non-AI ones using systematic financial and infrastructural analysis, uncovering how ByteDance's platform tools expand ByteDance as a multi-sided, multi-layered, and multi-situated platform. Platform tools, thus, facilitate growth along these three dimensions by encouraging platform dependence; interoperability and interdependence within ByteDance's app ecosystem; and platformization, including "parallel platformization." Our empirical work ultimately shows how ByteDance uses platform tools to accrue and operationalize infrastructural and economic power, and how apps have moved from discrete objects to interconnected clusters of platform tools.

Introduction

In April 2020, TikTok's parent company ByteDance published the video-editing app CapCut, which reached 250 million downloads within a year of its release. ByteDance promoted CapCut as a "free all-in-one" tool "for everyone to create anything anywhere," singling out its AI-driven affordances, which range from automated video editors to speech-to-text converters (CapCut, 2024). In this paper we argue that CapCut is indicative of ByteDance's broader corporate strategy to expand its suite of software tools, specifically AI-based tools, across the app ecosystem. By doing so, we challenge the idea of TikTok and CapCut being understood as discrete apps. Instead, ByteDance's apps are part of a growing, integrated app collection. In this sense, apps can be seen as assemblages of interrelated "media software," or "software tools for creating, interacting with, and sharing media" (Manovich, 2013, p. 3). In previous work, building on Foxman's (2019) insights on the relationship between platforms and tools, we argued that apps such as CapCut and TikTok also function as "platform tools" (Authors). In that capacity, ByteDance's apps are deployed by different platform users, from cultural producers to advertisers, (1) to make content for ByteDance apps and (2) to integrate apps in ByteDance's app ecosystem. For example, creators use TikTok's editing features to design filters, which then serve as templates for new filters, or as editing tools for video production. At the same time, such filters are integrated back into CapCut, increasing its functionality. Thus, these efforts tie TikTok and CapCut together at the infrastructural level, as well as generate more revenue by attracting more end-users and more diverse user groups.

In this paper we explore how ByteDance has expanded its infrastructural and economic footprint in the app economy by weaving a web of related apps. ByteDance's competitors, together with a seemingly endless slew of start-ups, have followed suit with their own platform tools, which makes the question of who owns and advances the means of "platform-dependent cultural production" ever more relevant (Poell et al., 2021). More precisely, our inquiry into ByteDance's platform tools points to the increasingly central role of generative AI in software tools.

Examining platform growth via platform tools

ByteDance manages a sizeable number of apps in both its domestic market and abroad. Many of them are aimed at supporting content creators, such as the photo and video editing apps CapCut, Ulike, and FaceU,

together with hybrid distribution/creation apps, such as Lemon8, TikTok, and Douyin. Taken together, these apps form a dynamic assemblage of "platform tools," i.e., a series of interrelated software resources that further integrate ByteDance's apps at the infrastructural and economic level. Untangling the evolution of this app ecosystem, then, allows us to uncover the specific infrastructural and economic shifts in how these tools are integrated, and how, ultimately, they are adopted by end-users and creators.

Platform infrastructures have primarily been explored from the perspective of data and datafication, or the conversion of various aspects of life into data (Couldry & Mejias, 2019; Sadowski, 2019). Apart from empirical analyses into application programming interfaces (van der Vlist et al., 2022) and software development kits (Blanke & Pybus, 2020), media scholars have shied away from discussing software tools in broader conversations about platform power. Therefore, we contend that platform tools contribute to accumulating and operationalizing infrastructural and economic power through (1) multi-sided, (2) multi-layered, and (3) multi-situated processes (Helmond, 2015; Helmond & van der Vlist, 2019). Let us unpack these. First, platform tools increase the number of user groups (sides) and bring them together by behaving as distinct "platform instances," i.e., "technical and economic platform configuration[s] that [facilitate] connectivity and interactions among end-users and multiple partners" (Nieborg & Helmond, 2019, p. 199). More succinctly, platform tools strengthen the multi-sided markets that platform companies operate. Second, platform tools contribute to a platform's infrastructural layeredness. That is, apps extend across economic sectors and everyday lived realities through platformization. Finally, platform tools support the platform as a regionally multi-situated company by enabling "parallel platformization" (Kaye et al., 2021). That is, apps such as Douyin and TikTok are "the same entity, offer nearly the same features, but differ in their infrastructures, governance, and market" (Kaye et al., 2021, p. 245). How, then, has ByteDance positioned its apps to expand along these three axes?

Surveying and mapping ByteDance's platform tools
Starting with ByteDance's introduction of humour app Neihan Duanzi in 2012, we conduct a systematic financial and infrastructural analysis of the company's software-based resources. For our financial analysis, we draw on documentation on corporate mergers, acquisitions, and venture capital investments by ByteDance Ltd. and its subsidiaries, which includes trade reports, news articles, and private market research databases Crunchbase and Pitchbook. For our infrastructural analysis we consult developer documentation provided by ByteDance, corporate promotional material, and technical tutorials to identify instances of software integration and use of generative AI. Then, we plot the financial and infrastructural changes over time, heeding calls from platform scholars to engage in "historiographic" approaches (Helmond & van der Vlist, 2019).

By unpacking ByteDance's apps as platform tools, we demonstrate that TikTok is not a discrete app but a platform tool that is part of a dynamic assemblage of apps (see Figure 1). Through the development of first-party platform tools (circles) and sourcing of third-party tools through acquisitions (rectangles) and venture capital investments (diamonds), ByteDance has grown its overall market. ByteDance supplies a number of all-in-one AI-based toolkits that streamline the cultural production process and improve the functionality of existing tools for multiple user groups, from cultural producers to advertisers. Platform tools outlined in red are key examples of tools that supplement existing tools. Moreover, platform tools diverge and converge to produce new platform tools—e.g., Live.Me and Musical.ly, which transformed into TikTok.

We notice that inter-app communication is made possible by data exchanges that provide infrastructural links among ByteDance's family of apps. Some of ByteDance's apps lie within the cultural industries (yellow shapes and TikTok in Figure 1), while others remain outside (blue shapes in Figure 1). Platform tools, then, are the connective glue at both the infrastructural level, resulting in platformization, and the economic level, extending ByteDance's reach beyond the cultural industries, thereby positioning ByteDance as a multi-layered platform. We also identify the ongoing process of parallel platformization, where ByteDance develops and deploys similar platform tools in separate ecosystems: the Chinese

(domestic) market and the international market, connected by the double-ended arrows in Figure 1. These instances of parallel tool building and parallel platformization allow ByteDance to be multi-situated, capturing both regional and global markets.
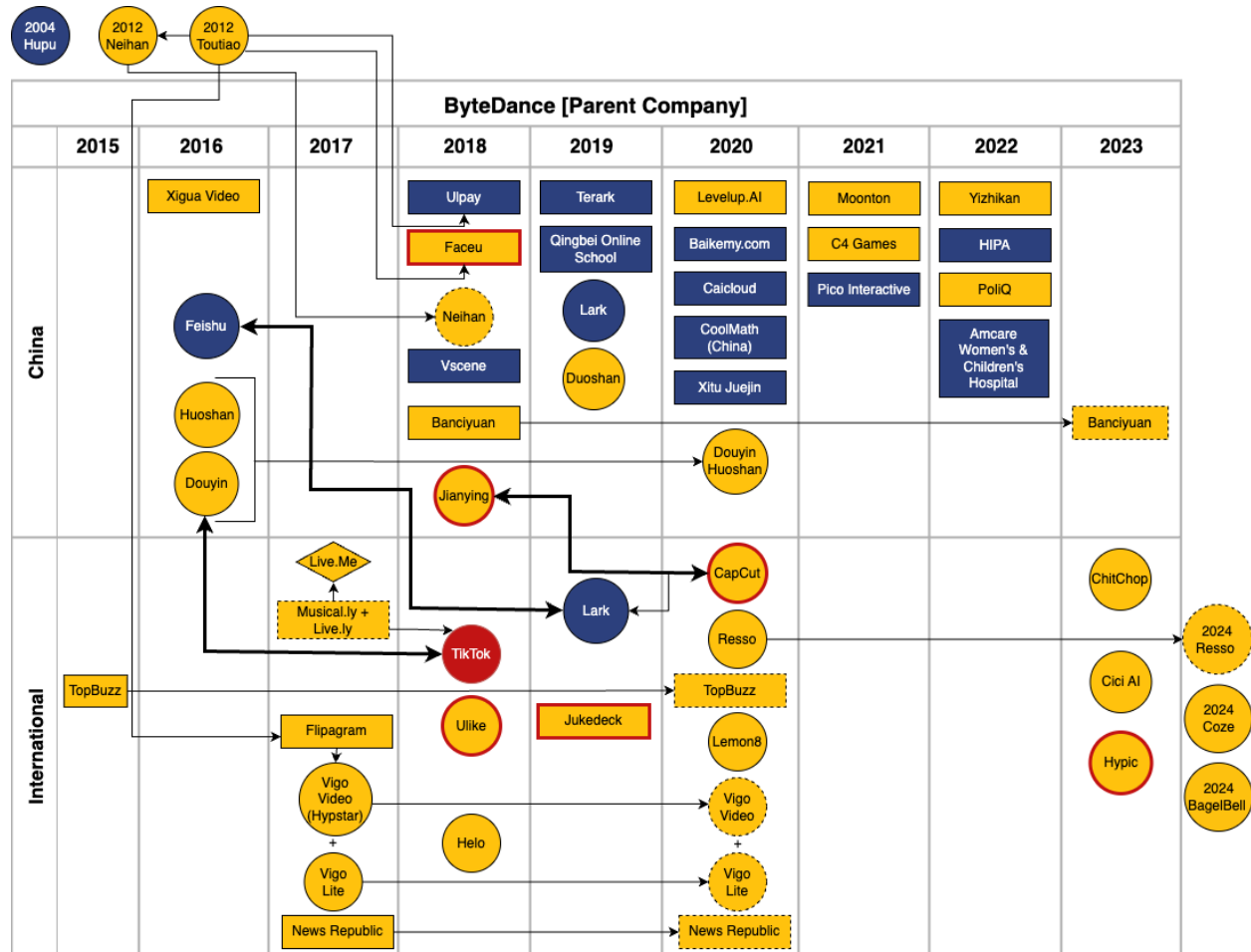

Figure 1. *Positioning TikTok in ByteDance's assemblage of apps*

In sum, what our analysis shows is that apps have moved from discrete objects to interconnected clusters of platform tools, thereby revealing an underexplored dimension of platform power. By concentrating on the breadth and depth of its AI-based platform tools in particular, ByteDance has increasingly become multi-sided, multi-layered, and multi-situated, securing further opportunities to expand its corporate conglomerate. With this exploratory analysis, we aim to lay the foundation for further research on how platform tools are adopted and negotiated by creators, and gain a deeper, empirical understanding of how generative AI is becoming increasingly central to the app economy.

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