

Searching for ‘Digital Asia’ in its Networks: Where the Spatial Turn Meets the Digital Turn

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Abstract

This article examines how digital methods can provide a way to search for ‘Digital Asia’ in its networks, interfaces, and media contents. Using the example of higher education institutions in Beijing, Hong Kong, and Taipei, the paper explores how search engines, institutional homepages, and hyperlink networks provide access into the workings and representations of academia online. The article finds that even a seemingly cosmopolitan endeavour such as academia exists in rather parochial spheres, and that users that enter those spheres do so in highly biased ways. Further reviewing the digital tools that lead to these findings, the article also argues that while digital methods promise to bring together the ‘digital turn’ and the ‘spatial turn’ in the humanities and social sciences, they also pose new challenges. These include theoretical concerns, like the risk of implicitly reproducing views of neoliberal modernity, but also practical concerns related to digital literacy.

Keywords

Area Studies – China – digital media – higher education – Hong Kong – internet – methodology – networks – Taiwan

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Where might we find 'Digital Asia'? As the various contributors to this special issue have pointed out, both the concept of the 'digital' and the idea of 'Asia' remain highly political. Any attempts, for instance, to see Asia either as a specific geographical place or as an entity with unique cultural or social characteristics have to confront the history of Orientalism that accompanies the term. Imagining Asia, whether from the outside in or from the inside out, is always an ideological endeavour.

If this is true for Asia, it is similarly true for the 'digital' – a topic that has traditionally elicited powerful spatial metaphors in both academia and popular culture. Concepts like 'cyberspace' or 'virtual space' have been a cornerstone of cultural imagination in the 1980s and 1990s, when science fiction authors like William Gibson (1984/1995) or Neil Stevenson (1992) popularized the image of data-jockeys riding the information highways of the web (cf. also Goto-Jones in this issue). In such visions of communication, the internet is often seen as a virtual cityscape that exists outside of, or parallel to, reality. Think only of the opening sequences of the 1996 Hollywood movie *Hackers*, which morphs computer switchboards onto aerial views of downtown Manhattan, or the now classic 1999 film *The Matrix*, with its bleak virtual urban spaces.

Such ideological frameworks can be useful, since they force us to think of connectivity and rapid interaction. At the same time, as Ethan Zuckerman (2013) has argued, the lasting appeal of 'cyberspace' as an exciting, sprawling cityscape also limits how academics, programmers, and policymakers think of digital processes. In reality, the idea of cyberspace as 'an "elsewhere" falls apart when your mom friends you on Facebook' (Stevenson 2012).

Previous spatial metaphors – be they the virtual cities of digital media studies or the continents and nation states of Area Studies – have thus increasingly proven insufficient in explaining the complexity that we face in our lives today. But what is to replace these frameworks?

In his contribution to this special issue, Prasenjit Duara stresses that we should think of regions like Asia as 'overlapping, intersecting networks, hubs and hinterland.' His arguments echo those of Manuel Castells (2010) or Ulrich Beck (2005), whose work has shown that we need to update our thinking by considering how our world consists of shifting terrains and relations. Indeed, thinking of societies as networks has become a powerful analogy that promises to connect previously static ideas of space with the dynamics and flows that characterize capitalist modernity. Castells (2009: 34) thus writes of the 'space of flows,' which, in his view, 'is made of nodes and networks; that is, of places connected by electronically powered communication networks through which flows of information [...] circulate and interact.'

It is telling that theories of digital media have similarly embraced networked, multilayered approaches while abandoning the idea of virtual worlds that exist outside of our daily existence. The world is 'made up of specific configurations of global, national, and local networks in a multidimensional space of social interaction' (Castells 2009: 19), and these interactions are increasingly defined by digital communications. Contemporary network theories thus promise to provide ways of 'mapping' real-world relations in great complexity. What is more, they place a strong emphasis on 'technology in the process of social transformation' (ibid: 24), whether it is the technology that makes long-haul transportation possible, that enables interventions in our biological and geological environments, or that allows instantaneous communication across vast distances. In the sociology of networks (Latour 2005), much like in media and communication studies, technology matters – and by extension, the medium matters. There is thus an opportunity to bring network ideas into dialogue with scholarship that takes digital media seriously in their own right, for instance by conducting research that 'follows the medium'.

The question, then, is whether it might be fruitful to search for 'Digital Asia' in its communication networks and digital interfaces. If Duara is correct that looking towards regional, transnational networks in our research can help us overcome the methodological nationalism that is so often engrained in area knowledge, then studying digital communication should provide an excellent example of infrastructures and processes that potentially transgress the borders of nation states.

My focus in this paper is twofold: On the one hand, I examine what methodological routes might serve as access points into 'Digital Asia'. What tools and research methods are available for 'mapping' and 'exploring' such a space, what are their strengths and weaknesses, and how successful are they ultimately at offering insights into contemporary politics, society, and culture? On the other hand, I deploy these tools and methods to explore what they can tell us about the potential for the kind of 'sustainable modernity' that Duara sees emerging in the networks of the Asian region. What can 'following the medium' teach us about regional processes and what can such an approach contribute to area scholarship? Can we expect digital media to facilitate transnational, regional cooperation in the way that optimistic accounts of new ICT tend to argue (cf. Shirky 2008), and as Duara suggests when he writes that recently emerging spaces of civic activism in Asia 'might have been well-nigh impossible without the kind of digital connectivity that exists in our time'?

To answer these questions, I examine one particular institutional setting: the higher education sector in what is sometimes called 'Greater China'. As we shall see, this sector presents itself as highly transnational, both through its

student communities and its research collaborations. How, then, are universities from the three cities Beijing, Hong Kong, and Taipei represented online, and how are they connected to each other and to other institutions on the web?

To follow the footprints of higher education institutions in 'Digital Asia', I am drawing from the methodological framework that Richard Rogers (2013) has created together with his colleagues at the University of Amsterdam's Digital Methods Initiative. I will first discuss what this approach entails, and how it fits into the evolving scholarship on digital technology and communication. I will then examine different methods for tracing communication networks and interfaces through software, and will provide various examples from Beijing, Hong Kong, and Taipei. This will include networks on the web, as well as search engines and interfaces that provide users with entry points into such networks.¹ After this discussion of how digital methods can provide valuable insights into digital processes in Asia, I will conclude by highlighting what shortcomings such approaches might have, where the limits of the existing tools and theories lie, and why scholarly inquiry into 'Digital Asia' will require dedicated institutional support and broad, multidisciplinary collaboration.

Studying the 'Digital' in Digital Asia

Research of the 'digital' has evolved over the past decades, and today encompasses disciplinary approaches ranging from sociology and anthropology to computational sciences (also cf. Schneider & Goto-Jones 2014: 10-11). As Rogers (2014) has pointed out, studies related to digital media and communication broadly fall into three methodological categories: traditional methods, digitized methods, and natively digital methods. Allow me to go over each in turn, always keeping in mind that these approaches are by no means mutually exclusive, but can be fruitfully combined.²

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- 1 In order not to extend the scope of this brief study too far, I am excluding here three other important elements that might qualify as entry points into, or reflections of, 'Digital Asia': the information available through user-generated online encyclopaedia's like Wikipedia or Beike Baidu, the networks of social media services like Facebook, Twitter, Renren, or Sina Weibo, and the worlds of digital games. For studies of online encyclopaedias in China and Taiwan, see the seminal work by Han-Teng Liao and Thomas Petzold (Petzold et al. 2012; Liao 2013; Liao & Petzold 2014). For a discussion of scholarship that focuses on social media in China, see Sullivan (2014). Finally, Goto-Jones discusses videogames as an access way to 'Digital Asia' in his contribution to this special issue.
 - 2 An example of such a mixed methodology is arguably John Postill's (2014) proposal for an 'epidemiographic' approach: a combination of classical ethnographic research with 'media

The first of these approaches encompasses scholarship that strongly uses *traditional* research methods, such as interviews, surveys, or participant observation, to study digital media usage. A seminal example is the in-depth work by Miller & Slater (2000) on internet use in Trinidad, which deploys house-to-house surveys and participant observation to provide a powerful critique of 'virtual reality' paradigms: as the authors show, how people use the internet is often strongly tied to the features of their local societies. Scholars who focus on the Asian context have conducted similarly insightful ethnographic studies, for example joining Chinese gaming conventions to find out how geek culture works in those communities (Szablewicz 2014), exploring how the introduction of broadband affects a specific family in rural China (McDonald 2014), examining how women in Seoul use media-sharing services on their smartphones (Hjorth 2014), or observing the digital play of Indian street kids to investigate whether digital technologies are helping the socially disenfranchised to overcome social hierarchies (Rangaswamy & Arora, forthcoming). These examples demonstrate powerfully how traditional ethnographies can contribute to our understanding of life in the 'second modernity' (Beck 2005), and how important they are as reality-checks of deceptive online/offline dichotomies.

The second category of research *digitizes* traditional research methods, for instance by utilizing online surveys, social media interviews, or participation in digital games and on social media platforms. Take the example of 'netnography' (Kozinets 2010), which transfers the traditional toolbox of anthropology to online settings, where interactions take place through avatars and virtual objects, and within digital societies and economies. A good example of this line of work is Boellstorff's study of 'Second Life' (2008), the social media service that allows its users to interact in a massively multiplayer online environment. Treating 'Second Life' as a place populated by users that can be observed and studied, Boellstorff 'travels' to this online world to 'live' among its inhabitants.

At the same time, digitized research does not need to have digital worlds as its subject. Such endeavours can also include the use of computation to study traditional social science and humanities topics, such as history, international politics, or literature. It is these approaches that are today arguably most directly associated with the quickly growing fields of digital humanities and computational social sciences, where an interest in 'big data', corpus analysis, and computer-assisted network analysis is changing the way scholars make

epidemiology' in the tradition of Dan Sperber's cultural anthropology (1996), which attempts to trace viral content and transmissions of meaning, for instance through tweets or Facebook posts.

sense of their subjects.³ In the study of Asia, such research includes a growing range of historical and contemporary work, for example studies that explore how knowledge was organized and disseminated through networks during China's Song Dynasty (De Weerd, forthcoming), or research that examines demographics and migration in Japan through the distribution of surnames (Cheshire et al. 2014). Javier Cha's contribution to this special issue provides a provocative discussion of how such approaches are currently being received in South Korea.

The third strategy is to utilize the elements that are 'native' to digital communication. This strategy explores what we might learn about social, political, cultural, and economic processes by examining how digital media work in particular contexts. In new media studies, such attempts to 'follow the medium' have received substantial traction, and are increasingly also being deployed in scholarship that examines issues in or from Asia. For the Chinese case, for instance, Gary King and his colleagues have traced how Chinese government censorship works online (King et al. 2013), and Jason Q. Ng (2013) has similarly tracked what the authorities delete from the microblogging platform Sina Weibo. In Hong Kong, Fu King-wa and his team are exploring how Weibo can be used as a research tool, for example to study how social media users react to tweets that announce an impending suicide attempt (Fu et al. 2013).

A major role in such studies falls to the use of digital tools – software applications that enable researchers to collect data from online and social media sources, analyze various (often relational or geolocational) properties of those data, and visualize the results. Combining these tools with qualitative content analysis is also common. In the following, I will explore what such an approach has to offer for the study of digital networks in Asia. Taking the work of Rogers (2013) as a guide, my focus will be on various tools and methods that are available to scholars, and I will review a selection of these to show what they can achieve and what they might lack. As examples, I will use the digital presences of universities in the three cities of Beijing, Hong Kong, and Taipei. Where my discussion veers towards questions of detailed content analysis, I will illustrate by using the case of Hong Kong's Polytechnic University, where I discussed these methods with postgraduates during the 2014 China Internet Research Conference.

It is important to note that my goal in this paper is not to provide a comprehensive digital analysis of higher education institutions from 'Greater China'. That would require more specific, fleshed-out research questions, as well as a more systematic setup for answering those questions. Instead, the examples

3 For a discussion and critique of big data research, cf. Boyd & Crawford (2012).

are meant to demonstrate where we might look for Digital Asia, and what an approach that 'follows the medium' can contribute to Area Studies scholarship.

The Digital Footprints of Educational Institutions in Greater China

In order to analyze how universities from different locales position themselves on the internet, we should first consider the channels through which users access digital information. I want to discuss three such paths – three interlocking access points to 'Digital Asia' – each with its own set of issues and questions: search engines, institutional homepages, and hyperlink networks.

Status-Authoring Devices: Searching Digital Asia

My first path leads through search engines. As Zuckerman (2013: 2241) points out, 'for many of us, information not easily accessible via a search engine doesn't exist.' The ubiquity of online search makes it a pressing concern to critically examine how search processes 'author' our knowledge of digital sources. To Rogers (2013: 86), a search engine like Google is 'a status-authoring device' that manages search results and 'delivers those "deserving" to be listed as the top sources.'

How, then, do search engines function as windows into the higher education sector online, and how do they pre-structure online information for users? This question is by no means trivial, particularly considering how recent shifts in search algorithms have made it increasingly difficult to set up searches that are sociologically or politically meaningful.⁴ The algorithms that various local Google services use, for instance google.com, google.com.hk, or google.com.tw, have always relied on a complex set of variables, and the biases that various localized Google sites introduce have been the subject of considerable scholarly attention (e.g. the contributions in Becker & Stalder 2009).

What makes the study of search engine behaviour more challenging today is the degree to which online search has become personalized (Feuz et al. 2011). Companies like Google incorporate the 'Daily Me' into their search technology: personalized data, such as IP location, individual social graphs, and past user behaviour, now help create results that are uniquely tailored to each individual user. If you google a search term on your home computer

4 An early treatment on the subject is Gordon & Pathak's 1999 study of search engine effectiveness. Lewandowski (2011) has updated the discussion about the intricacies of research methodology in his German summary of search engine scholarship. Such methodologies have been applied to the Malaysian context by Halim & Kaur (2006), as well as to the Chinese case by Jiang (2014).

you will receive different results than your next-door neighbour. You will even receive different results than you would on your office computer, your laptop, or your smartphone – unless you use a browser that allows you to log in with your personal details, in which case your personal searches are synchronized across devices. In any of these cases, the search engine takes your search personally: ‘Navigating through search brings our personal biases to the front,’ as Zuckerman (2013: 2954) puts it, and while it is intriguing to in fact study such biases, it is increasingly hard to compare or generalize search engine results. In an environment where online searches are tailored to personal needs, the adaptive yet obscure logic of search engine programming undermines research that strives for any kind of objectivity.

A way to deal with such personalization is to bypass these personalization processes, for instance by setting up a ‘research browsers’ (an anonymous, neutral machine that can simulate a clean, ‘vanilla’ search) and to then clear that browser’s history after each query (cf. Rogers 2013: 111).⁵ I conducted such searches with three different Google services (Google.com, Google.com.hk, and Google.com.tw), in three different language (English, simplified Chinese, and traditional Chinese), using the words ‘university’ (大学, 大學) plus the names of the three cities Beijing, Hong Kong, and Taipei, respectively.⁶ The results of these 27 search combinations are provided in the table below (Figure 1). Each block of the table shows the top five rankings that different language searches yielded for universities in the three cities on 25 September 2014. For ease of reference, I have marked all English-language results in white, all simplified Chinese results in light grey, and all traditional Chinese results

5 Firefox is a particularly useful browser option in this regard, particularly since it includes a mode for ‘private browsing’ that disables the user’s history (an option that can also easily be set up as the default). The Digital Methods Initiative further provides a useful Firefox tie-in that enables the scraping of websites (cf. <https://wiki.digitalmethods.net/Dmi/FirefoxToolBar>, last accessed 20 October 2014).

6 I have also used an IP address from the region, to avoid receiving results reflecting my own geolocation in Europe. For this particular example, I have only used one proxy server, located in Hong Kong, though a full study would likely need to also repeat the searches using proxies in Taipei and Beijing (note, however, that Google is blocked in mainland China, so a search from there would not yield any results). In order to simulate browsing from different locations, users can either use paid VPN services or the free built-in ‘Foxy Proxy’ extension for Firefox. A list of proxy IP addresses from around the world is available through the following website: http://www.cool-proxy.net/proxies/http_proxy_list/sort:score/direction:desc (retrieved on 20 October 2014). An important note on different geolocations: a location outside of the US will often automatically redirect users to the local Google. To still be able to access the dot-com search engine, Google offers a ‘no-country-redirect’ (or: NCR) version of its service, available at: www.google.com/ncr.

Beijing	Google.com			Google.com.hk			Google.com.tw		
	English	Chinese (simplified)	Chinese (traditional)	English	Chinese (simplified)	Chinese (traditional)	English	Chinese (simplified)	Chinese (traditional)
No. 1	Peking University (en)	Peking University (sp)	China University of Geoscience (sp)	Peking University (en)	Peking University (sp)	Peking University (sp)	Peking University (sp)	Peking University (sp)	Peking University (sp)
No. 2	Wikipedia: List of universities in Beijing (en)	Wikipedia: List of universities in Beijing (sp)	Peking University (sp)	Wikipedia: Peking University (en)	Wikipedia: List of universities in Beijing (sp)	Wikipedia: List of universities in Beijing (sp)	Peking University (en)	Peking University (en)	Wikipedia: List of universities in Beijing (sp)
No. 3	Wikipedia: Peking University (en)	China University of Geoscience (sp)	Wikipedia: Peking University (sp)	Wikipedia: List of universities in Beijing (en)	Wikipedia: China University of Mining and Technology (sp)	Wikipedia: Peking University (sp)	Wikipedia: Peking University (en)	Wikipedia: Peking University (en)	Wikipedia: Peking University (sp)
No. 4	Beijing Normal University (en)	China University of Petroleum (sp)	Wikipedia: List of universities in Beijing (sp)	Wikipedia: Beijing City University (en)	Baike Baidu: Beijing Institute of Technology (sp)	China University of Geoscience (sp)	Wikipedia: List of universities in Beijing (en)	Wikipedia: List of universities in Beijing (en)	Chinese University of Geoscience (sp)
No. 5	TopUniversities.com Peking University Page (en)	China University of Petroleum, Career Centre (sp)	China University of Geoscience, School of Continuing Education (sp)	Beijing Normal University (en)	Sina.com: List of universities in China (sp)	Baike Baidu: Peking University (sp)	Beijing City University (sp)	Beijing City University (sp)	People's Daily Online: Beijing's Top 20 Universities (sp)

FIGURE 1A Local Google search results in the three language scripts English (en), simplified Chinese (sp), and traditional Chinese (tr), for universities in Beijing.

Hong Kong English	Google.com			Google.com.hk			Google.com.tw		
	Chinese (simplified)	Chinese (traditional)	English	Chinese (simplified)	Chinese (traditional)	English	Chinese (simplified)	Chinese (traditional)	
No. 1	The University of Hong Kong (en)	The University of Hong Kong (tr)	The University of Hong Kong (en)	The University of Hong Kong (tr)	The University of Hong Kong (tr)	The University of Hong Kong (en)	The University of Hong Kong: Address (tr)	The University of Hong Kong: Address (tr)	
No. 2	City University of Hong Kong (en)	The University of Hong Kong (sp)	City University of Hong Kong (en)	The University of Hong Kong: Address (tr)	The University of Hong Kong: Address (tr)	The University of Hong Kong (tr)	Wikipedia: The University of Hong Kong (tr)	Wikipedia: The University of Hong Kong (tr)	
No. 3	Wikipedia: The University of Hong Kong (en)	Education18.com: Hong Kong university ranking (tr)	Wikipedia: University of Hong Kong (en)	Wikipedia: The University of Hong Kong (tr)	Education18.com: Hong Kong university ranking (tr)	Wikipedia: The University of Hong Kong (en)	The University of Hong Kong (tr)	Education18.com: Hong Kong university ranking (tr)	
No. 4	The Chinese University of Hong Kong (en)	Wikipedia: The University of Hong Kong (tr)	The Chinese University of Hong Kong (en)	City University of Hong Kong (tr)	Chinese University of Hong Kong (tr)	Polytechnic University of Hong Kong (en)	The University of Hong Kong, School of Professional and Continuing Education (tr)	The University of Hong Kong (tr)	
No. 5	Hong Kong Baptist University (en)	The Chinese University of Hong Kong (tr)	Hong Kong Baptist University (en)	Baibe Baidu: The University of Hong Kong (sp)	Wikipedia: The University of Hong Kong (tr)	City University of Hong Kong (en)	Education18.com: Hong Kong university ranking (tr)	BBC News Chinese (2013/09/10): The University of Hong Kong leads university rankings in Hong Kong and on both sides of the Straits' (tr)	

FIGURE 1B Local Google search results in the three language scripts English (en), simplified Chinese (sp), and traditional Chinese (tr), for universities in Hong Kong.

Taipei	Google.com			Google.com.hk			Google.com.tw		
	English	Chinese (simplified)	Chinese (traditional)	English	Chinese (simplified)	Chinese (traditional)	English	Chinese (simplified)	Chinese (traditional)
No. 1	National Taipei University (en)	National Taipei University (tr)	National Taipei University (tr)	National Taipei University (en)	National Taipei University (tr)	National Taipei University (tr)	University of Taipei (en)	National Taipei University (tr)	Scrollable Slider: University logos and links. (tr)
No. 2	National Taiwan University (en)	Taipei Medical University (tr)	Wikipedia: National Taipei University (tr)	National Taipei University San Shia Campus (tr)	Baike Baidu: National Taipei University (sp)	Wikipedia: National Taipei University (tr)	University of Taipei (tr)	Ministry of Education: List of universities in Taiwan (tr)	AirBNB.com: Places to stay in Taipei (tr).
No. 3	Wikipedia: National Taipei University (en)	Wikipedia: National Taipei University (tr)	Wikipedia: List of universities in Taipei (tr)	National Taiwan University (en)	Wikipedia: List of universities in Taipei (tr)	Wikipedia: List of universities in Taipei (tr)	National Taipei University (en)	Wikipedia: List of universities in Taipei (tr)	National Taipei University (tr)
No. 4	Wikipedia: University of Taipei (en)	Wikipedia: University of Taipei / National Taipei University (disambiguated). (tr)	National Taipei University: Address (tr)	Wikipedia: National Taipei University (en)	Wikipedia: University of Taipei (tr)	National Taipei University: Address (tr)	National Taipei University Colleges (en)	Taipei Medical University (tr)	University of Taipei (tr)
No. 5	Wikipedia: List of universities in Taipei (en)	Baike Baidu: National Taipei University (tr)	National Taiwan University of Arts: Address (tr)	Wikipedia: University of Taipei (en)	Wikipedia: National Taipei University (tr)	National Taiwan University of the Arts (tr)	National Chengchi University (tr)	University of Taipei (tr)	Wikipedia: List of universities in Taipei (tr)

FIGURE 1C Local Google search results in the three language scripts English (en), simplified Chinese (sp), and traditional Chinese (tr), for universities in Taipei.

in dark grey. Also, higher education institutions are printed in bold script, Wikipedia entries are underlined, and all other results appear in regular script.

A quick glance across the table already shows that even though several results appear prominently in all searches (e.g. Beijing University, The University of Hong Kong, and National Taipei University), overall each individual search provides a different window into this part of 'Digital Asia'. The divide between simplified Chinese usage on the mainland and traditional Chinese usage in Hong Kong and Taiwan is highly visible: searches that focus on Beijing return only simplified or English results, even where such searches are conducted through localized Hong Kong and Taiwan engines, and even where results would in fact be available in traditional Chinese (e.g. Wikipedia entries). The inverse is true for Hong Kong and Taipei (particularly searched through google.com.tw), which almost exclusively return traditional Chinese results, regardless of whether the searches were conducted in simplified or traditional characters.⁷

The politics of search are visible in how different local Google engines rank their top suggestions, and in how some results are prominent in certain cases but do not appear at all in others. Taipei Medical University, for instance, appears only in simplified Chinese searches but not in traditional Chinese searches. More stunningly, two universities in Beijing only appear in the Chinese-language searches (most notably when searching through Google.com): the China University of Petroleum and the China University of Geoscience. These institutions outrank famous institutions like Tsinghua University, the Foreign Affairs University, or the Foreign Studies University, none of which appear at all in the rankings, and the University of Geoscience in one case even eclipses Beijing University as the top result in the traditional Chinese search on Google.com. Finally, it is noteworthy how ubiquitous Wikipedia results are throughout these search results. All of the searches return entries on specific universities, and in some cases the results also feature Wikipedia's lists of higher education institutions in the respective cities. In comparison, Chinese encyclopaedia entries are much rarer: only Baike Baidu is present, and only in Chinese-language searches.

What, then, are we to make of such results? The comparison highlights how searches in various languages and using different localized Google search engines help curate unique impressions of what is available and what is relevant. Despite certain similarities across these searches, 'Digital Asia' – when viewed through the search engine Google – lives in the eye of the beholder. The broader implications, however, come into full focus once we extend this analysis to search engine rankings by local *alternatives* to Google. Figure 2

7 Taiwan's Google is also the only service that returns a scrollable slider of Taipei universities at the top of its search results. All other services have a hyperlink as their first entry.

Beijing	Baidu		360 Search			Sogou	
	English	Chinese (simplified)	Chinese (traditional)	English	Chinese (simplified)	Chinese (traditional)	English
No. 1	Peking University (sp)	Baidu Education: Beijing University Ranking (sp)	Baidu Education: Beijing University Ranking (sp)	Peking University (sp)	Peking University (sp)	Peking University (sp)	Peking University (sp)
No. 2	Beijing Normal University (sp)	Peking University (sp)	Peking University (sp)	Beijing Normal University (sp)	360 Baike: Peking University (sp)	360 Baike: Peking University (sp)	Peking University (sp)
No. 3	China University of Geoscience (sp)	Beijing Normal University (sp)	Beijing Normal University (sp)	Beijing University of Technology (sp)	Beijing Normal University (sp)	Beijing Normal University (sp)	Beijing Normal University (sp)
No. 4	Beijing University of Technology (sp)	Baidu Baike: Peking University (sp)	Baidu Baike: Peking University (sp)	360 Answers: why is Peking University not called "Beijing University"?	Beijing University of Technology (sp)	Beijing University of Technology (sp)	Beijing Jiaotong University (en)
No. 5	Peking University (en)	Baidu Maps: Universities in Beijing (sp)	Baidu Maps: Universities in Beijing (sp)	360 Maps: Universities in Beijing (sp)	360 Maps: Universities in Beijing (sp)	360 Maps: Universities in Beijing (sp)	Sogou Weixin: Accounts from universities in Beijing (sp)

FIGURE 2A Search results in popular Chinese search engines, conducted in the three language scripts English (en), simplified Chinese (sp), and traditional Chinese (tr), for universities in Beijing.

Hong Kong	Baidu			360 Search			Sogou		
	English	Chinese (simplified)	Chinese (traditional)	English	Chinese (simplified)	Chinese (traditional)	English	Chinese (simplified)	Chinese (traditional)
No. 1	The University of Hong Kong (en)	Baidu Education: Hong Kong University Ranking (sp)	Baidu Education: Hong Kong University Ranking (sp)	The University of Hong Kong (en)	360 Watch: Videos related to "university" and "Hong Kong" (sp)	360 Watch: Videos related to "university" and "Hong Kong" (sp)	The University of Hong Kong (en)	Slider: University logos and links. (sp)	Slider: University logos and links. (sp)
No. 2	Hong Kong Baptist University (en)	Baidu Maps: Universities in Hong Kong (sp)	Baidu Maps: Universities in Hong Kong (sp)	Youdao Dictionary: University of Hong Kong (sp)	360 News: Top five recent news links related to "university" and "Taipei" (sp)	360 News: Top five recent news links related to "university" and "Taipei" (sp)	City University of Hong Kong (en)	Sogou Baike: The University of Hong Kong (sp)	Sogou Baike: The University of Hong Kong (sp)
No. 3	The Chinese University of Hong Kong (en)	The University of Hong Kong (en)	The University of Hong Kong (en)	City University of Hong Kong (en)	360 Baike: The University of Hong Kong (sp)	360 Baike: The University of Hong Kong (sp)	Hong Kong Baptist University (en)	Sogou Maps: Universities in Hong Kong (sp)	Sogou Maps: Universities in Hong Kong (sp)
No. 4	City University of Hong Kong (en)	Hong Kong University of Science and Technology (en)	Hong Kong University of Science and Technology (en)	Hong Kong Baptist University (en)	The University of Hong Kong (sp)	360 Answers: What good universities are there in Hong Kong? (sp)	Shark Tours ponography website: "Hong Kong University Pictures" (sp)	Tencent Weibo: Account of The University of Hong Kong (sp)	Tencent Weibo: Account of The University of Hong Kong (sp)
No. 5	The University of Hong Kong Summer Programme (en)	Baidu Baike: The University of Hong Kong (sp)	Baidu Baike: The University of Hong Kong (sp)	Hong Kong University of Science and Technology (en)	360 maps: Universities in Hong Kong (sp)	360 maps: Universities in Hong Kong (sp)	Wikipedia: University of Hong Kong (en)	Sogou Weixin: Accounts from universities in Hong Kong (sp)	Sharewithyou.com College Information: The University of Hong Kong (sp)

FIGURE 2B Search results in popular Chinese search engines, conducted in the three language scripts English (en), simplified Chinese (sp), and traditional Chinese (tr), for universities in Hong Kong.

Taipei	Baidu			360 Search			Sogou		
	English	Chinese (simplified)	Chinese (traditional)	English	Chinese (simplified)	Chinese (traditional)	English	Chinese (simplified)	Chinese (traditional)
No. 1	National Taipei University of Technology (en)	Baidu Maps: Taipei Chibaomo Snack Bar (Nankai Outlet)	Baidu Maps: Taipei Chibaomo Snack Bar (Nankai Outlet)	National Taipei University (sp)	360 Baike: University of Taipei (sp)	360 Baike: University of Taipei (sp)	Wikipedia: Taipei Medical University (en)	Slider: University logos and links. (sp)	Slider: University logos and links. (sp)
No. 2	National Taipei University (sp)	National Taipei University (sp)	National Taipei University (sp)	Taipei Medical University Hospital (sp)	National Taipei University (sp)	National Taipei University (sp)	National Taipei University of Technology (sp)	National Taipei University (sp)	National Taipei University (sp)
No. 3	National Taipei University (en)	Baidu: Top five recent news links related to "university" and "Taipei" (sp)	Baidu: Top five recent news links related to "university" and "Taipei" (sp)	National Taipei University Library (sp)	National Taipei University of Technology (sp)	National Taipei University of Technology (sp)	National Taipei University (en)	Sogou Baike: National Taipei University (sp)	Sogou Baike: National Taipei University (sp)
No. 4	Baidu Baike: National Taipei University (sp)	Baidu Baike: National Taipei University (sp)	Baidu Baike: National Taipei University (sp)	National Taipei University of Technology (sp)	Shih Chien University (sp)	Shih Chien University (sp)	Research paper on molecular biology (includes a National Yang-Ming University contributor) (en)	University of Taipei (sp)	University of Taipei (sp)
No. 5	National Taipei University of Technology (sp)	Baidu Answers: What good universities are there in Taipei? (sp)	Baidu Answers: What good universities are there in Taipei? (sp)	Nihaowang.com: National Taipei University of Technology (sp)	360 Maps: Universities in Taipei (sp)	360 Maps: Universities in Taipei (sp)	National Taipei University of Technology (en)	Sogou Images: Pictures related to "university" and "Taipei" (sp)	Sogou Images: Pictures related to "university" and "Taipei" (sp)

FIGURE 2C Search results in popular Chinese search engines, conducted in the three language scripts English (en), simplified Chinese (sp), and traditional Chinese (tr), for universities in Taipei.

shows the results of the same research processes, but this time using mainland China's three most popular search engines of 2014 (Baidu, 360 Search, and Sogou Search), accessed from a Beijing IP address.⁸

Much could be written about these results, but three features are particularly noteworthy in the present context. First, the mainland search engines do not return any results in traditional Chinese, even when queried with traditional characters for institutions in locales that predominantly use the traditional character system. On China's search engines, only simplified Chinese is valid Chinese. English sites appear in the rankings, but are rare overall – particularly when the search concerns mainland China itself (in this case: universities in Beijing). A significant language bias is thus already built into these search engines. Second, each search engine provides information and services almost exclusively from its allied corporate sister-sites. In all three cases, the search results include maps, encyclopaedia entries, microblogs, and news (much like results retrieved through Google would), but these results do not include services from competing companies. Baidu thus references Baidu Baike, Baidu News, Baidu Answers, Baidu Maps, etc., while 360 and Sogou do the same within their respective corporate structure. Wikipedia is entirely absent on Baidu and 360 Search (recall that Google, in contrast, returned both Wikipedia and Baidu Baike results).

These findings demonstrate to what degree the political economy of Chinese search engines leads to biased search engine results: each enterprise adopts the kind of integrated business model that companies like Google, Microsoft, or Apple also deploy, but arguably takes this approach to new heights. In this manner, each company produces and curates its contents in-house, potentially creating economies of scale (and preventing smaller services from competing), but at the expense of content diversity. In addition, such business models also fit neatly into the Chinese government's strategies for internet governance (State Council Information Office 2010), which encourage centralized content production and moderated discussions through a small number of national conglomerates.

We should pause here to recall that these results are the outcome of an artificial setup created by the researcher, which makes it hard to generalize about search priorities and outcomes. No actual user would receive precisely these results. In fact, a useful application for these search results would be to check them against results from computers that have not been artificially 'normalized' (cf. Lewandowski 2011), and to monitor results over time. This brief experiment

8 According to the Chinese web analytics provider CNZZ (2014), Baidu topped the Chinese usage rankings with a share (*zhanyou lǜ* 占有率) of 54.03%, followed by 360 Search (29.24%) and Sogou (14.71%). All subsequent search services scored below half a per cent.

thus already draws attention to the increasing challenge of studying digital search behaviour: as search engines evolve and companies tweak their algorithms – generally in ways that remain obscure to users and researchers alike – results become less tangible and less representative. One of the tasks of ongoing scholarship in this field (cf. Becker & Stalder 2009) is to creatively develop research setups that are both technically feasible and meaningful in sociological, cultural, or political ways. Nevertheless, this preliminary exploration of 'Digital Asia' through its search engines at the very least suggests that such a space may not offer an infrastructure that is unequivocally predisposed to transnational interactions – for the case of mainland China, it seems that the governing institutions of this particular nation state are very successful at integrating corporate services in ways that produce the kind of sovereign, national intranet through which the authorities are hoping to 'guide public opinion' (China Media Project 2013).

Homepages: The Faces of Digital Asia

Let us turn to the information sources that online searches commonly lead to: institutional homepages.⁹ This is where users arrive after they have clicked the respective result of their search engine query, though users can of course also input the address of the site directly into a browser or reach these pages through links sent via email, text message, or social media. So what can these homepages tell us about a particular institution?

A first issue to consider is that homepages to some extent simulate the features and design choices of traditional media types like the newspaper front page. This suggests that they lend themselves to similar visual communication analyses that scholars deploy to explore traditional broadsheets: what layout choices did the designers make? What can header hierarchies tell us about the priorities on the page? How do colour schemes highlight certain elements, and how does the flow of text and symbols construct specific reading directions? How do images and text interact on the page? Maybe most importantly: what statements does the page make, whether through text or images? For all of these questions, we can draw from approaches like discourse analysis or semiotics to explore how a homepage represents its institution and what discourses it constructs on issues like education or scientific progress. What is more, such an approach can also shed light on the functional properties of the homepage, for instance by exploring how certain features of the medium (whether at the front end or the back end) inform the communication choices that the creators made, or how such features might guide usage along particular paths.

9 For introductions to the analysis of homepages, see in particular Pauwels (2005) and Knox (2009).

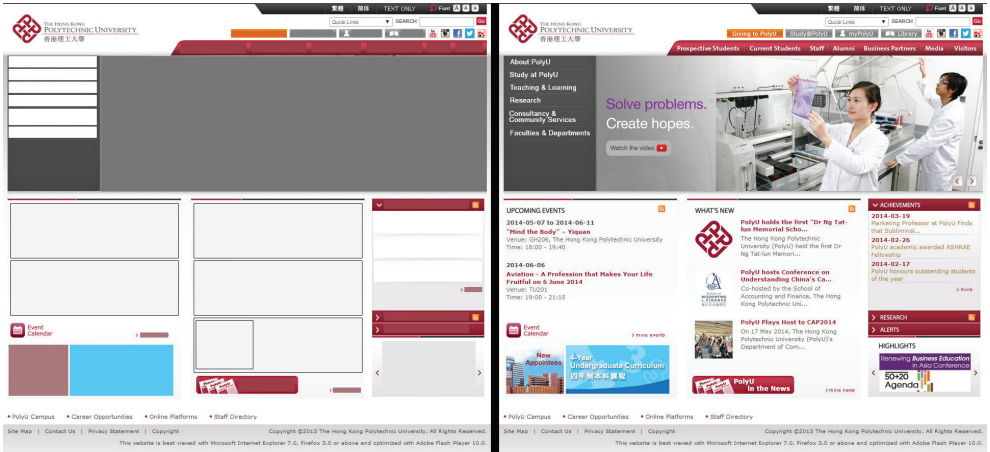


FIGURE 3 *The homepage of Hong Kong Polytechnic University (English version), reduced to a template (left) and as it appeared in June 2014 (right).*

Allow me to use the homepage of Hong Kong Polytechnic University (HKPU) as an example. A first question would be what elements the homepage deploys, and how these elements play out on the page. To illustrate this, I have taken the homepage as it appeared in June 2014 and I have reduced it to a template (Figure 3).

HKPU's web team has here opted for an elegant, modern look that provides a manageable number of links, including teaser information, in blocks that resemble those commonly used on news websites. The white background and the menu arrangement emphasises clarity and functionality over miscellaneous detail. This 'cleanliness' of the page frames the university's prominent discourse on hard science and engineering, which I will return to in a moment. Aside from these general layout options, buttons allow users to log onto various services (like library catalogues and student accounts) and access the social media networks Youtube, Instagram, Facebook, Twitter, and Sina Weibo. All information can be switched to simplified or traditional Chinese, which is then rendered in the same layout as the English version.

The main layout element is the grey-themed banner in the top third of the page, which contains an animated slider of images. While some of these images relate to specific events or announcements, a number of them are more permanent features of HKPU's self-presentation, and I have reproduced these images in Figure 4.

All of these images are clickable, leading to additional content, and they are framed by captions that appear to their left. The first image introduces



FIGURE 4 *Images from Hong Kong Polytechnic University's homepage slider bar.*

HKPU's 'service learning' scheme, which integrates formerly extra-curricular social service activities into the university's degree programmes. The caption reads 'Service Learning – to nurture responsible global citizens.' The next image links to a Youtube video with the title 'solve problems, create hopes,' which provides an overview of the university's research achievements. Much like the video itself, the image on the homepage promotes a modernist view of academic research by focusing on the natural sciences. It showcases clean lab environments, technicians inspecting charts and test tubes, and various kinds of technology and machinery in action. Aside from this commitment to a particular scientific discourse, with its narrow focus on applied science rather than broader knowledge-based inquiries, the video provides insights into how HKPU constructs its identity as a high-tech research institution from Hong Kong: the exposition of research projects shifts seamlessly from activities and innovations that are explicitly geared towards Hong Kong (environmental tech, health and food safety procedures, etc.), research that is meant 'to support our nation's development' (e.g. high-speed rail in mainland China), and work that takes a transnational approach (such as engineering projects for various international space agencies).

Following an image that links to recent campus (re)developments (entitled 'Campus Development – We aim to develop a functional and sustainable campus...'), the slider introduces its donation scheme with a photo of diverse young students and the caption 'Giving to PolyU – Support our holistic education and innovative research'. The angle of the image and the mise-en-scene suggests that the photo is a spontaneous 'selfie' of students from different backgrounds who are together enjoying their time at HKPU.

From this very brief overview of visual representations, layout choices, and verbal statements, we can already tentatively conclude that HKPU uses its homepage to present itself as a cosmopolitan centre of high-tech innovation that promotes cultural diversity, civic responsibility, and transnational cooperation. Traditional or post-modern views of education and knowledge (e.g. a focus on critical thinking) are also visible, but only upon closer reading of lower-level webpages. Overall, they play a subordinate role to the idea that HKPU is a place where transnationally connected, dynamic young researchers come together to find practical solutions to the world's problems through advanced technology.

As appealing as that discourse is, and as ubiquitous as it has arguably become in higher education institutions around the world, it nevertheless risks misrepresenting capitalist modernity, as will become clear in the next section. First, however, allow me to return to the question of methods. Static analyses

of images and texts are useful when the goal is to isolate specific visual or verbal statements and explore how they contribute to an overall worldviews in a media product. At the same time, however, they side-step the fact that websites are not static. They are spaces of what Jenkins (2008) has called 'media convergence'. Homepages deploy elements from not just one media type (e.g. newspapers), but from many different media types (e.g. film, radio, etc.). What is more, websites utilize communication methods that are not available in any traditional media mode, like drop-down menus, radio buttons, interactive sliders, pop-ups, scroll-over effects, comment sections, and hyperlinks. While Figures 3 and 4 show how some of these elements appear together on the 'page', they cannot reproduce how these elements work at the back end and what they do as users interact with them. An analysis of web content thus also needs to keep in mind that websites possess characteristics that are specific to the medium.

For instance, the information we see on the page is not the same for every user. It is a set of character strings and objects, rendered visible through the browser in a flexible manner: the site provides commands in mark-up language that remains invisible to the user, and the browser then uses these commands to translate the data into a readable experience. As a consequence, the same website can have a very different appearance on two different computers, for example if one device does not have a certain set of fonts installed. This adaptability of the content becomes even more pronounced for 'responsive layouts', which means that devices with different screen types like mobile phones, tablets, and desktop computers do not simply *re-size* websites but instead *re-arrange* them. Figure 5 shows how the HKPU homepage changes when viewed in browser windows of different sizes.

Notice also how the website layout presented in Figure 5 differs from the earlier image of the homepage (presented in Figure 3 above). This is because Figure 5 shows the homepage three months after the earlier screenshot was taken. Sometime between June and September 2014, HKPU updated its web design. The new homepage features more of HKPU's characteristic red colour scheme, a new menu, and a different layout for the news boxes. This highlights another important characteristic of the web: it evolves constantly. Content changes quickly, layout and design is modified frequently, and back-end aspects like content management systems and website plugins are updated on a regular basis. This is particularly true for the sites of institutions or agents that present themselves as rapidly evolving: for such actors, it becomes imperative to demonstrate their dynamic nature online, as well as to optimize their search engine relevance by progressively updating their web presence.

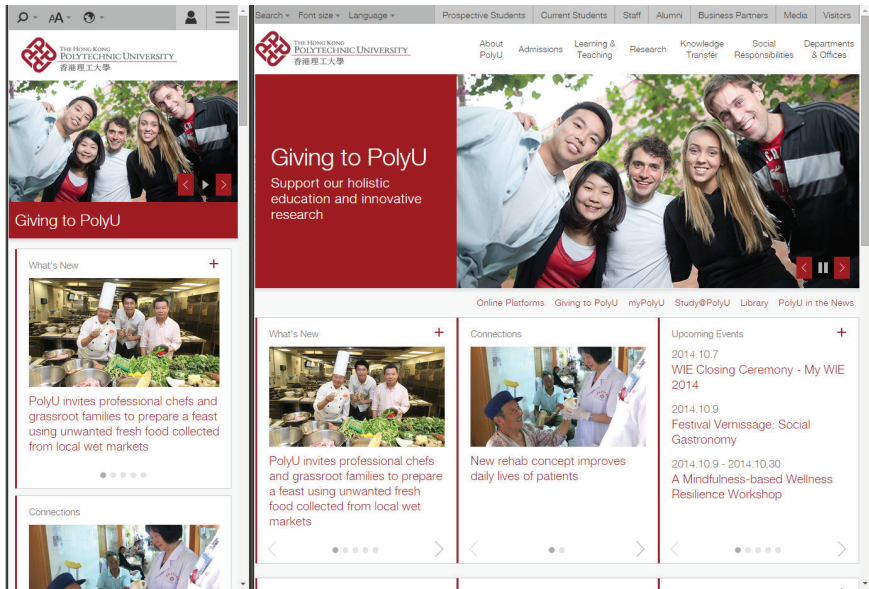


FIGURE 5 *The effects of responsive layouts: Hong Kong Polytechnic University's homepage in two different browser windows.*

In that sense, we should be cautious to liken such evolution to the changes that take place in the print media, where content on a front page also changes from one day to the next, where layout adjustments take place as well, and where printing technology and managerial styles shift at the 'back end' of the news rooms and printing services. While tempting, such an analogy quickly breaks down: we are not simply witnessing a difference in speed, but in kind. Newspaper front pages do not change their layout depending on who reads them, just like they do not swap one element for another while keeping the rest of the content stable. More importantly, the content choices of traditional media are governed by different commercial rationales, exemplified by concern over circulation numbers or focus-group comments, rather than by the fickle metrics of 'unique visitors' or 'page views' through which success on the internet is assessed.

Another major difference in how digital and traditional media treat content is in the way the content and its formatting is preserved over time. Most newspapers are archived in ways that allow users to retrieve a physical copy of a past front page exactly the way it looked on the day it was published – provided that users are willing to make the physical journey to the respective archive. The same is not necessarily true for webpages, which are archived and retrieved differently. Take again the example of HKPU. I have compiled below



FIGURE 6 The evolution of Hong Kong Polytechnic University's homepage over time.

a progression of that site's development over time (Figure 6), drawn from the Internet Archive's Wayback Machine.¹⁰

The Wayback Machine retains sites at certain points in time, including their interactive features. It thus provides a useful way to travel back in time and monitor the evolution of a particular homepage. In this case, we can see how HKPU's homepage has become more minimalist, 'clean', and functional over time. In this, the site has followed broader trends in web design towards minimalism like those championed by companies like Google or Apple.

Yet, the example also shows where the limits of an archival approach to website histories lie: the archive only contains selected moments of change, not the rendition of the site on every single day of its existence. What is more, it at times fails to reproduce the original content, for instance when online elements like images have been moved or deleted – this seems to have been

10 The Wayback Machine is available at <http://archive.org/web/> (last accessed 20 October 2014). For a discussion, see Rogers (2013: ch. 3).

the case for the homepage copies of 2000, 2006, and 2009 in Figure 6 above. In each case, placeholders show where images, videos, or other missing elements should normally go.

So while homepages offer an intriguing window into 'Digital Asia' and its evolution, the examples demonstrate where the future challenges of web content analyses lie, and how studying homepages will require a flexible set of tools and methods that take the converging and unique media characteristics of websites into account.

Digital Asia's Hyperlink Networks

The first two inroads into 'Digital Asia' that I have discussed so far were less about digital networks and more about interfaces and digital content. Let us turn to a feature of online communication that opens up possibilities for network analysis: the hyperlink. Such linkages have traditionally been regarded as pathways through information sources, allowing users to seamlessly 'travel' from one web space to the next. As we shall see in a moment, such analogies can be misleading. Linking can reflect very different kinds of behaviour – for example referencing an institutional affiliation, issuing a critique or praise, deploying an aspirational marker, or merely referencing content – which is why scholars are increasingly interpreting hyperlinks as marks of acknowledgement.¹¹ An interesting question then is how different actors and institutions link to one another on the web.

One method to explore this question is the IssueCrawler software, created by the Digital Methods Initiative in Amsterdam. The IssueCrawler is a browser-based, open access program that allows researchers to input a number of webpages and map the linkages between them.¹² Various studies have deployed this method, for instance to explore how political blogs in Australia are connected (Bruns 2007), or how environmental issues play out in European webspheres (cf. Rogers 2013: ch.2). Since the software crawls websites for html code, it is not limited to sources in any specific language, and can consequently be used to map web networks in scripts like Chinese, Japanese, or Korean.

What this mapping process looks for are co-links between source pages, meaning that the program collects all pages that a set of sources link to, and then retains those that have received at least two links from those sources. To better understand the implications of co-link analyses, imagine we wanted to create a network of contributors to this journal, based on the question of

11 For discussions of hyperlinks and their social and political meanings, see Beaulieu 2005, Park & Thelwall 2003, and Thelwall 2004.

12 The tool is available upon registration at the following URL: <https://www.issuecrawler.net/index.php> (last accessed 20 October 2014).

who had sent emails to whom during the latest peer-reviewing process. We could map these relations by representing each contributor as a circle, and then drawing arrows from each person to everyone who received an email from that source.

Now imagine a scenario in which the only interactions between these people were individual email exchanges with the editor, but no exchanges had taken place between the authors themselves. The resulting map would be a star, with the editor at the centre and the authors each isolated at one of the star's points (see the image on the left in Figure 7 below). Such a scenario raises theoretical questions: to what extent is this really a 'group' of people? Is it appropriate to view these linkages as a *net*? The IssueCrawler points to the qualitative difference between relations made up of single links and those made up of several cross-links. In our example, we would only consider an author to be part of the network if he or she had been in contact with at least two people in the network. The star-shaped formation on the left-hand side of Figure 7 would not constitute such a network, whereas the black nodes in the image on the right-hand side would.

Extending this logic to the World Wide Web, the IssueCrawler program thus retains only websites that have received at least two in-links from the sites that served as starting points for the search. The process can be refined in various ways, for instance by looking for links at different levels of remove, and by adjusting which of these levels of remove should be included as starting points for the co-link analysis. The different levels of remove each have distinct implications. To return to the example of academics writing for a journal, let us assume we used each author as a starting point and collected all the contacts to which they had each written emails in the week that the journal was returning peer-review feedback. The resulting first-degree map would include a vast

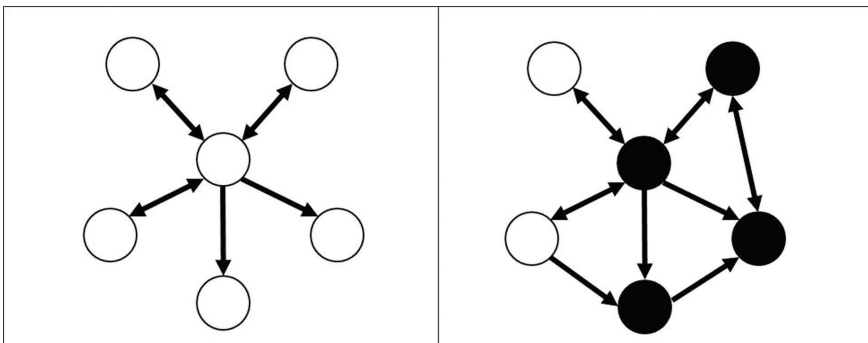


FIGURE 7 *What constitutes a 'network'? Left: single links between six actors, connected through the node at the centre. Right: 'co-links' between four networked actors (black).*

number of people, many of whom were not associated with the journal at all. If we now retained only people who had received emails from at least two of the authors, that network would shrink. We might interpret it as representing communication on the special issue theme itself, though further analysis would have to confirm this by checking who the various actors were and what the content of their exchange was. Regardless of the exact meaning we are later able to assign to these connections, what they make visible is a 'local' or 'neighbourhood' network of our starting actors.

Now imagine we were to expand the 'crawl' of the authors' correspondences by not only asking who *they* sent emails to, but by asking who the people *they got in touch with* sent emails to. If we then again retained everyone who had received at least two emails from any of the authors *or* their contacts, we would arrive at a larger second-degree network. A possible interpretation of the resulting network might be that we are looking at a set of people who are working more broadly on digital communication and media in Asia. Again, additional qualitative information would have to shed light on what the network represents, but the developers of the IssueCrawler refer to this sort of network as an 'issue network': a connection of actors sharing similar concerns. The software applies this logic to the internet, allowing the researcher to explore whether a particular set of websites is in fact linked into such an issue network through cross-references and acknowledgements of certain web resources.

For the purpose of illustrating this method, I have explored how the websites of higher education institutions are connected to larger networks. The IssueCrawler produces a directed spring graph of the resulting networks, which can already be useful for identifying actors in the network that for instance have received a large number of links, or to check whether a domain type is particularly common in the network (e.g. dot-com or dot-gov sites). The true power of the tool, however, becomes visible when we export the network data and explore it in more detail through specialised software like the open access program Gephi.¹³ With the aid of Gephi, we can, for instance, calculate different properties that are commonly used in social network analysis, making it possible to check which websites sit on the shortest paths across the network, which websites receive the most links from sources that receive many links themselves, or which sites are more or less strongly connected to the major clusters in the network.¹⁴

13 Gephi is available for download at the following URL: <http://gephi.github.io/> (last accessed 20 October 2014). See also the various tutorials on the website for instructions on how to use the software.

14 For an excellent introduction to network analysis and its specialized terms and calculations, see Scott (2012).

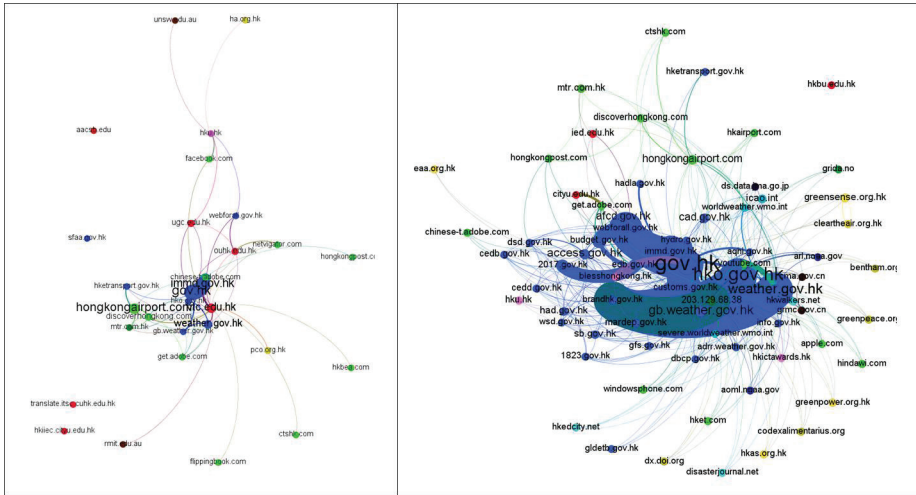


FIGURE 8 *The 'neighbourhood networks' (left) and 'issue networks' (right) of Hong Kong's higher education institutions. Colours represent different domain types, thickness of lines represents the number of links (degree), and the size of the nodes and labels represents the centrality of the respective websites.*

Figure 8 shows how Hong Kong's six public higher education institutions are connected online, first within a neighbourhood network (left), second within an issue network (right).

What can these networks tell us about the homepages of Hong Kong's public higher education institutions? One feature is that these institutions do not normally link to each other. In fact, there is so little linkage between the original sources that most of them do not appear in a first-degree diagram. We only arrive at something resembling a 'network' at two levels of remove, when the software starts mapping how the sites that the universities link to in turn link to other sites. These connections have very little to do with higher education – they are not 'issue' networks, in the sense that the original starting points of the analysis function as windows into scientific or educational concerns in Hong Kong. Nevertheless, there is a rationale behind these connections. We are looking at what Bruns (2007) has called a 'secondary issue network': Figure 8 represents the links of the education websites to media conglomerates, tech-companies, and most prominently to government institutions. As it turns out, the university homepages are excellent at referencing information for anyone who wishes to learn more about the rules, regulations, and opportunities of living and travelling in Hong Kong. They do not, however, include much acknowledgement of other scientific institutions, whether in Hong Kong or elsewhere. The kind of regional and transnational collaboration

that HKPU celebrates on its homepage is not visible in the way that Hong Kong university websites link to other institutions. Regardless of the actual connections that Hong Kong academia might maintain, Hong Kong’s universities are decidedly parochial on the web.

What happens if we change the starting points of the analysis by adding public universities in Taipei and in Beijing? If the internet is a space of transnational border transgression, we would expect that the various institutions acknowledge each other across national boundaries, particularly considering the cultural and linguistic similarities between these three sites. As it turns out, the institutions in all three cities are again tied into local government and business networks, but they do not normally link to each other (Figure 9).

I have coloured in the nodes according to their URL extensions, marking sites from Taiwan in shades of green (e.g. dot-tw, gov-dot-tw, etc.), sites from Hong Kong in shades of blue, and sites from mainland China in red, with other

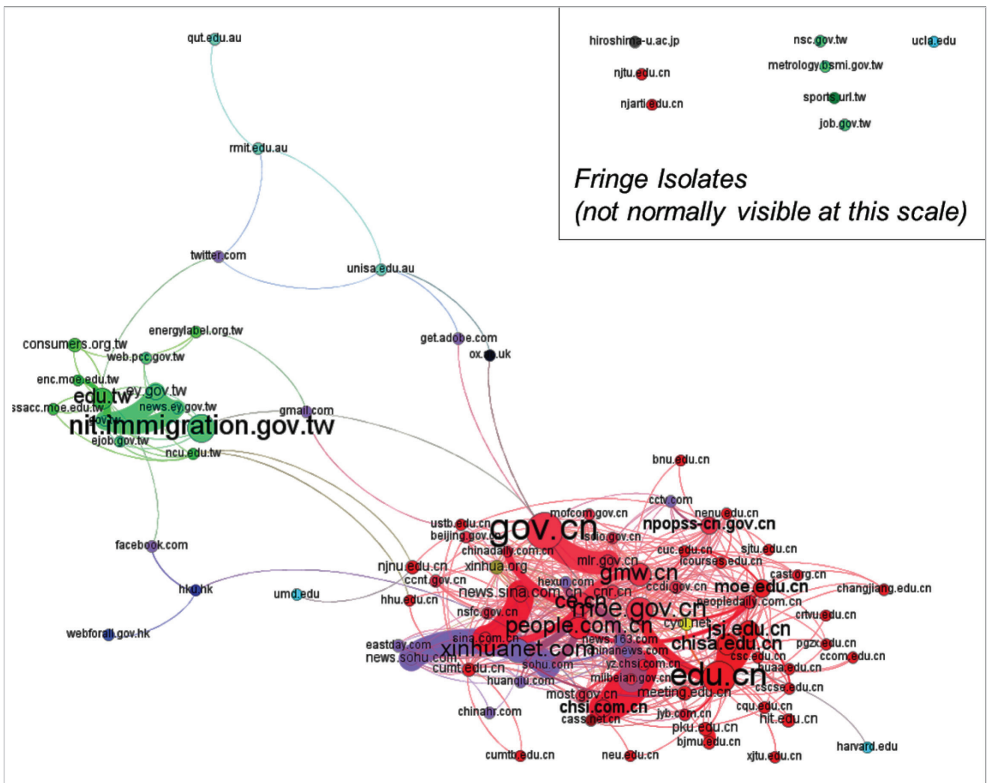


FIGURE 9 Higher education networks in ‘Greater China’. Colours represent different domain types, thickness of lines represents the number of links (degree), and the size of the nodes and labels represents the centrality of the respective websites.

international actors in dark grey or very light blue.¹⁵ Coloured in this fashion, the map turns out to largely reproduce the national boundaries of the region. The 'national webs' of Taiwan and of China are clearly visible, with only very few connections between these two spheres.

At this level of analysis, it now also becomes clear why it may be misleading to view web-links as routes along which users 'travel' across the net. The links are unidirectional, which means they only point one way. It may look as though there are connections between the webspheres in mainland China, Hong Kong, and Taiwan, but in reality these connections only appear because certain actors reference the same sites, like Gmail, Adobe, Facebook, Twitter, or the University of South Australia and Oxford University (note that both Twitter and Facebook are blocked in the People's Republic – as are all Google services as of May 2014; these are links emanating from sources in Hong Kong and Taiwan).

It is important to realize that the relational positions of the nodes to one another are crucial in network maps like this one, whereas their actual position on the canvas is arbitrary. This means we could theoretically manipulate the network further without doing violence to its relational properties. We could, for instance, move the green cluster to the right of the image, and could move the blue nodes to the lower edge, which would make the image increasingly look like a regional map of the East China Sea.

What this demonstrates, is that even in a setting like academia that is arguably relatively cosmopolitan (or at least tries to appear so), the digital networks of major institutions are far more 'national' than they are regional: they reference mostly 'domestic' institutions, and hardly acknowledge sources across the Taiwan Straits and the Pearl River Delta. This is particularly stunning considering the linguistic and cultural commonalities between the three cities under investigation. Such a finding raises the question of how realistic it is for researchers to overcome the 'methodological nationalism' that Beck (2005) criticizes and that Duara challenges in his contribution to this special issue. When the information networks we use collapse into local or national spaces, can we expect truly 'transnational' cooperation across borders?

15 The physical location of the sites can further be verified using IP-address geolocation, which is available through various free services like the Digital Methods Initiative (<https://tools.digitalmethods.net/beta/geoIP/>) or BrightCloud (<http://www.brightcloud.com/tools/url-ip-lookup.php>; both last accessed 20 October 2014).

Conclusion: The Promises and Limits of Digital Research

An analysis of higher education institutions in what is often called 'Greater China' demonstrates how scholars can fruitfully deploy different digital tools to explore a variety of entry points into 'Digital Asia', which I have here conceptualized as a heuristic space consisting of Asia's digital networks and interfaces. In this specific case, approaches that follow the medium reveal how biased our windows into 'Digital Asia' can be: search engines like Google and its various local alternatives create very different hierarchies of relevance in different local domains and languages, and the politics of hyperlinks lead to distinctive 'national' webs that often have little to do with science or education. These findings conflict with the self-image of many universities as open-minded, state-of-the-art places of learning that are regionally and globally connected. It is thus quite possible that the mechanics of today's internet facilitate our human tendency to stay within the realms we know and to seek out the information we are comfortable with, regardless of how much we want to see ourselves as cosmopolitans. While I have not explored the realm of social media in this paper, other research on 'homophily' suggests that the situation in networks like Twitter, Facebook, Weibo, or Weixin is much the same: technology makes it easy for users to remain in their parochial worlds and avoid serendipity (cf. Zuckerman 2013).

Such findings also raise questions about the potential for truly transnational collaborative activities of the kind that Duara discusses in his contribution to this special issue. Is it possible to overcome 'methodological nationalism' if the information resources we rely on already stack the deck in favour of nationalist knowledge frameworks, often in ways that remain obscure to us? Can grassroots initiatives and civil society actors work alongside nation-state institutions, and at eye-level with them, when these same institutions prioritize national sovereignty over transnational networks, as the case of China suggests? Contrary to cosmopolitan discourses on digital media, the 'Digital Asias', 'Digital Europes', 'Digital Americas', or 'Digital Africas' that we access through communication technologies and software may, in the end, resemble digital neighbourhoods within digital nations rather than regions in a transnationally connected world – a potentially bleak outlook for the kind of 'sustainable modernity' that Duara envisions.

While this brief analysis suggests that we can indeed look for 'Digital Asia' in its networks, interfaces, and program, it also highlights the shortcomings of approaches that 'follow the medium'. I have already discussed how digital media combine the characteristics of traditional media formats with highly specific digital features, and that this amalgamation tests the abilities of

scholars to remain flexible and creative when it comes to choosing research questions and methods. There are four additional challenges to digital research that I briefly want to discuss here by way of conclusion – the first two relate to theoretical concerns, the second two to practical problems.

The first issue is that digital scholarship needs to carefully side-step earlier arguments about 'virtuality' and questionable online/offline dichotomies. Digital methods powerfully highlight how important the specifics of digital communication technologies are, but with their focus on the technical aspects of media they may not always draw enough attention to how these technologies are embedded and anchored in everyday practices. Newer developments in the field have taken up this challenge, mainly by stressing the importance of geolocation. In some cases, locating the creators and users of digital media in specific places can tell us much about the realities in which they work and play. Think only of the difference between the political economy and legal system of a website that is run from within China and one that is run from within Taiwan. In other cases, the 'origin' of digital media may be less important, as Goto-Jones shows in his contribution to this special issue.

Meanwhile, more traditional works on media usage, for instance ethnographic approaches, have helped challenge the idea that online communication happens 'elsewhere'. There is thus potential for digital research to be fruitfully combined with the expertise of area scholars, who have a track record in critically exploring the importance of place through more traditional methods. This is where the digital turn in scholarship can truly meet the spatial turn.

A second challenge for digital research is to remain critical of the implications that popular theories of media and communication might have. This is particularly true for concepts that might implicitly sanction teleological views of neoliberal globalization – views in which technological progress happens automatically and generally contributes to the betterment of humankind. We need to remind ourselves that the ubiquity of digital media, just like the spread of other technologies, did not simply happen, but was created and promoted by policymakers, entrepreneurs, programmers, journalists, intellectuals, and (to some extent) everyday users – for better or worse. As Alice Marwick (2013) rightly points out, the 'leaders in this culture are the same people that technology discourse has celebrated for fifty years: young, white, rich men.' What digital media allow users to do is thus not removed from the power relations that characterize the modern world. Benney (2014) has made a similar point in his study of design choices that went into creating the microblogging platform Sina Weibo: digital technologies are not value-neutral tools, but are often created by elites to serve certain purposes. In that sense, scholars would be well advised to re-examine academic concepts such as the 'information age' or the

'network society' (Castells 2009, 2010), and to carefully consider how they are used in utopian digital discourses that primarily benefit the social strata that Hoofd (2008) has called 'speed elites' (see also Virilio 1977/2006).

The third issue concerns a practical matter: researchers' proficiency in digital research methods and their critical usage of digital tools. As I hope the discussion in this article has shown, deciding how to deploy digital tools and then interpret the results is by no means a trivial matter. It is not always obvious what, for instance, a cluster of linked websites or a ranking of search results can tell us about social, political, and economic processes. Take the example of how different analysts measure 'importance' in networks: is a website important if it *received* many links or if it *provides* many links? Is it important if it received many links from websites that *also* received many links? Or should we return to a view of hyperlinks that sees them as routes across a network? In that case, importance might be equivalent to a central position within the network. Researchers of other digital topics, like homepage content, social media networks, or user-generated encyclopaedias, each face such specific technical questions, and there are no default answers. Good digital scholarship thus has a strong responsibility to remain critical of its assumptions and be as transparent as possible when it comes to discussing the analytical and presentational decisions that informed the research.

Closely related to this problem is the final issue: how *software* informs our analytical decisions. The programs that digital analyses are based on often make choices for the researcher, and it is crucial to know what these choices are. The example of the co-link analysis discussed above is one such case: the idea that linked nodes only truly constitute a community if they are cross-linked is programmed into the IssueCrawler software. That decision is informed by a theoretical rationale that can be very useful, but that nevertheless needs to be interrogated for each specific case. For third-party tools by non-profit academic organizations, like the IssueCrawler or Gephi, the software solutions tend to come with detailed explanations that are meant to disclose all such rationales and, by extension, empower researchers to make good decisions when using these tools. However, this may not be the case for third-party solutions that are created by commercial enterprises, like free IP-checks or social media analytics.

What is more, many analytical programs use plug-ins and libraries that are created by yet other companies; for instance, the application programming interfaces (APIs) of Twitter or Weibo. It is crucial that users of such software are aware of the limitations and biases that are built into its mechanics. A key qualification of scholars is thus increasingly the ability to 'look under the hood' of the digital tools they deploy and the data they use. An elementary

understanding of programming languages like C++, Java, or Python is becoming a matter of general literacy (cf. also Manovich 2013), not just for those who use digital tools in their research, but for all scholars who want to be able to critically contribute to the rapidly evolving discussions on digital media and communication.

Yet, we need to ask whether we can realistically expect academics in the arts, humanities, and social sciences to learn programming languages and acquire such 'code literacy', on top of their teaching, research, and administrative duties. The same goes for students in undergraduate and graduate programmes, who are trying to fit an entire education into three or four years of time. It is the responsibility of higher learning to impart the crucial skills of critical thinking, which today includes an awareness of how our societies are 'coded'; however, it remains an open question whether the educational institutions and pedagogic tools of the modern industrial era are equipped to handle these new challenges (cf. Robinson 2011). The problem is aggravated by the rapid evolution of computer science itself, where coding fashions change quickly, and where even seasoned professionals are no longer able to keep up with the newest trends (cf. Chandra 2014). Without more forceful acknowledgement of how crucial research and teaching in digital media are, and without adequate institutional support, scholars will always remain behind, while their colleagues at Google, Apple, or Tencent shape the world as we know it.

In that sense, Duara is right when he argues that the problems humanity faces today can only be addressed through collaborative, transnational efforts. This kind of 'transnationalism' may not currently be as prominently reflected in our communication networks as it deserves to be, and it may indeed be confronted with powerful barriers in the form of capitalist national systems and the parochial human tendencies that these systems thrive on. Yet, this should not detract from the potential aspirational power of searches for a 'sustainable modernity' in 'Digital Asia'. In Asia, as much as elsewhere, grassroots initiatives that link digital media and education, like maker movements, crypto-parties, or hacklabs, are already demonstrating what such collaboration might look like. Scholars would be well advised to take a cue from such efforts as they continue to explore where we might find places like 'Digital Asia'.

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