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Mark D. Griffiths

International Gaming Research Unit**,** Psychology Department

Nottingham Trent University, 50 Shakespeare Street, Nottingham, NG1 4FQ, United Kingdom

Email: mark.griffiths@ntu.ac.uk

Mark D. Griffiths is Distinguished Professor of Behavioural Addiction in the Psychology Department at Nottingham Trent University in Nottingham, United Kingdom.

The regulatory landscape in gambling has evolved fast over the past decade particularly as a result of technological advances in the sector. Issues such as player protection, age and identity verification, and game integrity have become hot topics. One area that has gained growing interest from an online gambling regulatory perspective is that of geolocation. This is because some jurisdictions have to determine an individual's physical location before that individual is permitted to gamble on games according to that country's and/or state's laws.

Historically, online gambling operators simply asked gamblers to state their location before they could legally gamble online but laws were passed in several jurisdictions (such as Nevada and New Jersey in the US) where it became necessary to use geolocation technology to establish where the gambler was physically located before they could wager money online. For online gambling operators who are chasing the global market, such laws provide challenges because they will need to hold a license for each player's jurisdiction which would allow gambling access where permitted and prohibit gambling where they are not[1].

Failure to comply with specific jurisdictional laws can have serious consequences for any online gambling operator (on top of any reputational damage) including the possibility of civil fines, imposition of criminal penalties (both state and federal), revocation of their gaming license, and/or seizing or shutting down of their gambling website(s)[2]. For instance, in 2017, New Jersey fined the gambling operator Amaya $25,000 for accepting bets from out-of-state players. The New Jersey Division of Gaming Enforcement identified a "flaw" in Amaya's geolocation software, which allowed "a limited number" of gamblers outside of New Jersey to

wager "for a short period of time before a subsequent geolocation check detected such patrons and blocked them"[3].

During the coming years, one of the priorities for online gambling operators will be to implement state-of-the-art technology to comply with the country-specific jurisdictional requirements, as well as ensure optimum quality across all devices, and provide a more localized experience for their clientele[1]. However, if players are determined to gamble online in jurisdictions where they are not allowed to, they can gain illegal access by using proxy servers such as virtual private network (VPN) technologies. To protect their license integrity and prohibit illegal gambling, some gambling operators are now using internet protocol (IP) intelligence to identify suspicious gambling activity. Such technology can determine a gambler's location at postcode level (without them being personally identifiable to comply with data protection laws) and can determine if gamblers are using proxy VPN servers to mask their geographical whereabouts – although it should also be noted that some geolocation software has had difficulties verifying individuals who live close to US state borders.

As a result of state gambling legislation, many companies[4] have set themselves up as solution providers in this area including Avoco Secure Ltd (London, UK), GeoComply Ltd (Nevada, US), XYverify (New York, US), Digital Element (Georgia, US), GambleID LLC (Texas, US), Skyhook Wireless (Massachusetts, US), and Net Shop Internet Services Ltd (Cyprus). Furthermore, jurisdictional efforts to block (and blacklist) unlicensed foreign operators from access in given territories using geolocation have usually been deemed legal and constitutional by national courts[5].

Anna Sainsbury (CEO, GeoComply) has outlined the 'basics' of geolocation[6] making clear that geolocation does not refer to a single type of technology and that there are a variety of methods that have different advantages and disadvantages. Some methods are better for locating gamblers using a smartphone or tablet, whereas others are better for locating gamblers on their computers. Sainsbury described four different types of geolocation: IP address geolocation, WiFi geolocation, cellular positioning, and GPS (global positioning system) along with their strengths and weaknesses.

- IP geolocation services rely on databases containing known locations of assigned blocks of IP addresses. However, it is relatively easy to disguise an IP address location by using proxy servers. Sainsbury says this is *"akin to an out-of-state player asking a*

friend who lives in a regulated jurisdiction to place a wager for them" (p. 34).

- WiFi geolocation tends to be more accurate than IP geolocation and compares WiFi access points that a device is detecting with locations of mapped WiFi networks that are stored in a database. However, it is still possible for gamblers to disguise their whereabouts although this *"requires financial resources, time, and technical know-how far beyond that of the average computer user"* (p.35).

- GPS receivers are in-built on most contemporary tablets and smartphones, and is probably the most accurate type of geolocation according to Sainsbury. Although it is a readily available form of geolocation for mobile gaming operators, its accuracy can *"be reduced in some environments—such as the insides of buildings and urban canyons (i.e., between skyscrapers)"* (p.35). As with IP geolocation, gamblers can disguise themselves relatively easily.

- Cellular positioning (CP) is another type of geolocation that is useful for mobile gambling operators. CP incorporates a number of techniques that can be *"used to determine the position of a cellular device, including cell ID, Time Difference of Arrival, and Angle of Arrival"* (p.35). CP has much higher accuracy in urban areas compared to rural areas because the density of cellular base stations is greater in urban areas. Sainsbury also notes: *"Given that state borders are often in rural locations, the ability of cellular positioning to accurately determine the location of a player is questionable at best. Also, of course, knowing where a player's cell phone is does not guarantee that the player or his or her computer is in the same location"* (p.35).

She concludes that the best solution is therefore to use multiple geolocation technologies simultaneously to get the best accuracy. While most literature on geolocation talks about the positive benefits for enforcing regulation, little consideration has been given as to how such technologies could be used by gambling operators for more exploitative practices.

The use of behavioral analytics and 'big data' for both marketing and player protection has become widespread in the gambling industry. Data science was typically used to calculate odds within the sports betting sector, but Mike Buck (Head of Delivery of IT consultancy firm BJSS) says that gambling operators can now use it to track player journeys and behavior alongside external data sources including social media and geolocation[7]. In the sports betting market, Buck also says such data (including geolocation data) can provide richer business intelligence, which allows operators to *"understand changing sentiment amongst sports fans, and to tweak their products to appeal to these sentiments…[gambling] companies are constantly attempting*

to increase market share by offering an improved customer experience. By taking note of these pointers, any business will be able to build a service that is sufficiently agile to create scalable efficiencies and, most importantly, attract and retain more customers" (p.8) [7].

While this quote does not mention anything that is necessarily exploitative, it does suggest that geolocation can be used to retain more customers (which will increase the company's revenue). In the UK, an article in the *Daily Telegraph* newspaper[8] noted that big data are used all the time for marketing purposes and geolocation data is part of a much bigger picture in providing personalized marketing for a gambling operator's clientele. I have argued since 2002 that big data can be used both exploitatively and for protecting gamblers, and that there is a thin line between customer enhancement and customer exploitation[9]. The same data can be used for very different purposes. For example, the marketing department can use a player's behavioral tracking data to identify the biggest spenders and target them as their 'VIP' players, whereas the corporate social responsibility department can use the same data to identify the heaviest players with the thought that some of these will be problem gamblers and that they have a duty of care to intervene and help such players. However, marketers in the gambling industry typically use all available data to leverage extra money being spent by their customers. If a company can use smartphone geolocation to know that an individual is watching a particular football match at a particular football stadium, it would not be a surprise if that individual was sent an incentive to place an in-play bet on the match the individual is actually watching live.

The above example has appeared in recent media reports in the UK.[8] Such media reports have claimed that gambling operators could use geolocation services to identify their clientele with ongoing events and send them targeted alerts using push notifications, encouraging potentially vulnerable players to put a bet on the game they are watching at that very moment. If gambling operators are routinely utilizing players' personal data as a way of targeting online marketing and advertising to them, it needs to be carried out in accordance with the transparency requirements of data protection law.

The company Digital Element[10] specifically note in their marketing material that IP Intelligence and geolocation data *"provides information about online gamers and gamblers such as real-time location or connection type, allowing organizations to gain automatic insight into otherwise hard-to-pinpoint unregistered users, whether for marketing, gameplay or regulatory purposes...[a gambling company can] monetize online and mobile games by serving geotargeted ads, which increase response rates by 30 to 40 percent"*. Here, the

technology is explicitly mentioned as something that can help as much for marketing and gameplay as it can for regulatory purposes[10]. Use of geolocation technology also means that gambling operators can provide local currency wagers and/or content (e.g., local sports results) based on where the individual is accessing the gambling website. As Digital Element notes: *"In this way, IP geolocation technology helps gambling companies build more meaningful relationships with their customers and yield higher levels of trust, brand loyalty and, ultimately, revenue"*.

Geolocation technology is here to stay and gambling operators will use such technologies in any way that they have to (i.e., to adhere to jurisdictional regulation) as well as find innovative ways to use it that may be different from the ways for which it was first used. One such way may be targeted marketing based on the location of their clientele. Such practices might not have player protection at the heart of their implementation, and it is up to all stakeholders, including gambling regulators and researchers, to monitor how geolocation is being used both now and in the future.

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