PERSONAL DATA BREACH ON THE INTERNET: A CASE STUDY ON GOOGLE FONT

İnternette Kişisel Veri İhlalleri: Google Font Üzerine Bir Örnek Çalışma

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Abstract

Web pages have maintained their popularity from the moment the internet entered our lives becoming a social media catalogue for every sector. Websites facilitated and accelerated many processes such as reaching target audiences, advertising, or sales. Thus, the presence of every sector in the social environment was ensured. With the development of information technology, design opportunities have also developed and the visuality and attractiveness of web pages have gradually increased. Video and text effects are at the top of the design possibilities. Apart from the attractive possibilities of these

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developing design possibilities, they have also been used for malicious purposes such as stealing or damaging information. This study addresses how the use of Google Fonts conflicts with the European Union's General Data Protection Regulation (GDPR) and the ways to solve this problem. The GDPR has introduced strict rules on the protection and processing of personal data. However, Google Fonts, which is widely used by web developers and designers, sends users' IP addresses to Google's servers without explicitly stating how this data is processed. This is contrary to the GDPR principles of transparency and data minimization. This article elaborates on the privacy implications of using Google Fonts as well as the GDPR violations. As a solution, this study introduces alternatives such as local font hosting, open-source font libraries, and associated best practices. It also emphasizes the significance of the adoption of privacy-oriented design principles by web developers and designers and discusses the potential of these approaches to achieve GDPR compliance. In terms of theoretical and practical perspective, this study aims to provide a roadmap for harmonizing the use of Google Fonts and similar services with applicable privacy-related legislation.

Keywords: Personal Data Breach, Google Fonts, GDPR, Web Pages, Information Systems

Öz

Web sayfaları internetin hayatımıza girdiği andan itibaren popülerliğini korumuştur. Çünkü tartışmasız her sektörün sosyal medyada kataloğu olmuştur. Web sayfaları ile hedef kitlelere ulaşmak, reklam ya da satış yapmak gibi işlemler çok kolay ve hızlı olmuştur. Böylelikle her sektörün sosyal ortamda görünürlüğü sağlanmıştır. Bilişim teknolojisinin gelişmesiyle birlikte tasarım imkanları da gelişerek web sayfalarının görselliği ve çekiciliği giderek artmıştır. Tasarım imkanlarının başında video ve yazı efektleri gelmektedir. Gelişen tasarım olanaklarının sunduğu çekici imkanlar, kişisel bilgilerin çalması

veya bu bilgilere zarar verilmesi gibi kötü niyetli kullanımları da beraberinde getirmiştir. Bu çalışma, Google Fonts kullanımının Avrupa Birliği'nin Genel Veri Koruma Tüzüğü (GDPR) ile nasıl çatıştığını ve bu sorunun çözüm yollarını ele almaktadır. GDPR, bireylerin kişisel verilerinin korunması ve işlenmesi konusunda katı kurallar getirmiştir. Ancak, web geliştiricileri ve tasarımcıları tarafından yaygın olarak kullanılan Google Fonts, kullanıcıların IP adreslerini Google'ın sunucularına gönderirken, bu verilerin işlenme şeklini açıkça belirtmemektedir. Bu durum, GDPR'ın şeffaflık ve veri minimizasyonu ilkelerine aykırıdır. Makale, GDPR ihlallerinin yanı sıra, Google Fonts kullanımının gizlilik üzerindeki etkilerini de detaylı bir şekilde incelemektedir. Çözüm olarak, yerel font barındırma, açık kaynaklı font kütüphaneleri gibi alternatifler ve bu yöntemlerin uygulanmasıyla ilgili en iyi pratikler sunulmaktadır. Ayrıca, web geliştiricileri ve tasarımcılarının gizlilik odaklı tasarım ilkelerini benimsemelerinin önemi vurgulanmakta ve bu yaklaşımların GDPR uyumunu sağlama potansiyeli tartışılmaktadır. Bu çalışma hem teorik hem de pratik açıdan, Google Fonts ve benzeri hizmetlerin kullanımının gizlilikle ilgili mevcut mevzuata uyumlu hale getirilmesi için bir yol haritası sunmayı amaçlamaktadır.

Anahtar Kelimeler: Kişisel Veri İhlali, Google Fonts, GDPR, Web Sayfaları, Bilgi Sistemleri

I. Introduction

With the development of information systems, the advantages of the Internet are gradually improving. Since the first use of the Internet, web pages have entered our lives and have always enhanced their popularity.[1] Web pages with

[1] Angela Mottaeva and Bibigul Issayeva. 2023. "Features of Using Modern Information Technologies in Management Activities." *In E3S Web of Conferences*. Vol. 381. EDP Sciences. https://doi.org/10.1051/e3sconf/202338102010.

increasing usage, contain very significant personal information in their memory.[2]

The GDPR is designed to ensure the protection of individuals' personal data. Personal data is highly significant and is often referred to as the "new oil" of the digital age. Possessing, processing, and utilizing personal information for specific purposes confers substantial power. Such information includes valuable resources like addresses, beliefs, interests, purchasing details, and behavioral tendencies.[3] However, the use of third-party web services such as Google Fonts has led to allegations that such services violate GDPR principles by collecting and processing users' IP addresses.[4] Substantially in Germany, the legal obligations for website owners have increased remarkably, and, in some cases, website owners have faced GDPR violation accusations in court due to their use of Google Fonts.[5]

Therefore, our study analyses the GDPR-related legal challenges faced by website owners and developers, with a particular focus on the cases filed in Germany and the outcomes of these cases. Existing academic literature and legal antecedents will also be considered when assessing the impact of GDPR implementation and court decisions in Germany on website operators.

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[2] Chris Jay Hoofnagle, Bart van der Sloot, and Frederik Zuiderveen Borgesius. 2019. "The European Union General Data Protection Regulation: What It Is and What It Means." *Information and Communications Technology Law* 28 (1): 65–98. https://doi.org/10.1080/13600834.2019.1573501.

[3] Syrine Ferjaoui. 2020. "Data: The New Form of Wealth and Power." *IEEE Potentials* 39 (6): 6–10. https://doi.org/10.1109/MPOT.2020.3016359.

[4] Christian Kurtz, Martin Semmann, and Tilo Böhmann. 2018. "Privacy by Design to Comply with GDPR Privacy by Design to Comply with GDPR: A Review on Third-Party Data Processors Completed Research.".

[5] Garrett A. Johnson, Scott K. Shriver, and Samuel G. Goldberg. 2023. "Privacy and Market Concentration: Intended and Unintended Consequences of the GDPR." *Management Science* 69 (10): 5695–5721.

On the other hand, this study also introduces practical solutions and alternatives that can be implemented to overcome these legal challenges faced by website owners and developers and providing guidance for website design and operation in a way that protects user privacy and complies with the GDPR. The solutions will include the advantages of hosting fonts on local servers rather than using outsourced services such as Google Fonts.[6] The implementation of this approach, potential challenges, and best practices to consider will also be discussed. The study aims to address the feasibility and effectiveness of these remedies by considering existing legal frameworks and court decisions.

II. Literature Review

In the existing literature, there is no academic study on the subject matter. However, similar to the practices of different countries regarding how typefaces should be protected, it is generally emphasized that typefaces are protected within the scope of copyright law or design law.

In American law, typefaces are protected under design law, not copyright law. In 1978 EltraCorp. v. Ringer,[7] the court concluded that typefaces are industrial designs and are not works of fine art protected by copyright.[8] However, in the 1992 Adobe Systems Inc. v. Southern Software Inc. decision,[9] the court

[6] Tobias Mueller, Daniel Klotzsche, Dominik Herrmann, and Hannes Federrath. 2019. "Dangers and Prevalence of Unprotected Web Fonts." https://github.com/muelli/SansFingerprintSans.

[7] Aaron Perzanowski. 2018. "The Limits of Copyright Office Expertise." *734 BERKELEY TECHNOLOGY LAW JOURNAL* 33:733. https://doi.org/10.15779/Z38348GG7J.

[8] Jacqueline D Lipton, William Berkson, and Mr Ulrich Stiehl. 2009. "To © or Not to @? Copyright and Innovation in the Digital Typeface Industry."

[9] Donald F. McGAHN II. 1995. "Copyright Infringement of Protected Computer Software: An Analytical Method to Determine Substantial Similarity' (1995)

held that digitized typefaces, in other words, "fonts", are protectable under copyright based on the conceptual distinction explained above. The findings indicate that the typeface Veracity of Southern Software Inc. is substantially similar to and infringes the typeface Utopia of Adobe Systems Inc.[10]

In the UK, typefaces are generally protected under copyright law as works of fine art.[11] The CPDA provides specific exceptions for copyright infringement concerning typefaces and, unlike other copyrights, classifies the term of protection of typefaces as 25 years.[12]

Similarly, in Germany, typefaces are protected as works of fine art under copyright law. Here, unlike in the UK, typefaces benefit from a 10-year protection but can be extended for a further 15 years upon payment of an additional fee.[13] "Fonts", on the other hand, are classified as computer programs and are protected under German law with broader copyright protection than typefaces.[14]

However, although some argue that fonts/typefaces can also be protected under trademark law, it is widely accepted that only theirs can be trademarked.[15]

21(1) Rutgers Computer & Technology Law." *Rutgers Computer & Technology Law Journal*. Vol. 21. https://heinonline.org/HOL/License.

[10] Charles Bigelow. 2020. "The Font Wars, Part 1." *IEEE Annals of the History of Computing* 42 (1): 7–24.

[11] Sri Hartini, and Rudi Hartono. 2023. "Civil Legal Protection Against Misuse of Free License of Copyright Works For Font Designs Provided For Personal Use." *Journal of Law and Sustainable Development* 11 (12): e2008.

[12] Elena Cooper. 2018. *Art and Modern Copyright*. Cambridge University Press.

[13] Koray Güven. 2021. "Unities of Art: Reconciling Function and Copyright." *IIC International Review of Intellectual Property and Competition Law* 52 (9): 1161–89.

[14] Klaus Lodigkeit. 2006. Intellectual Property Rights in Computer Programs in the USA And Germany. Peter Lang Publishing.

[15] Jessica Gore. 2020. "A Type of Theft." *Available at SSRN 3792393*, December

III. Formation and Explanation of The Case

It emphasizes the potential privacy and data protection issues of outsourcing website resources.[16] In particular, the transmission of the user's IP address to outsourcing servers and the recording of such information raise important issues in terms of data protection laws such as GDPR.[17] Website owners and developers should act in a way to protect users' privacy rights in such outsourcing.

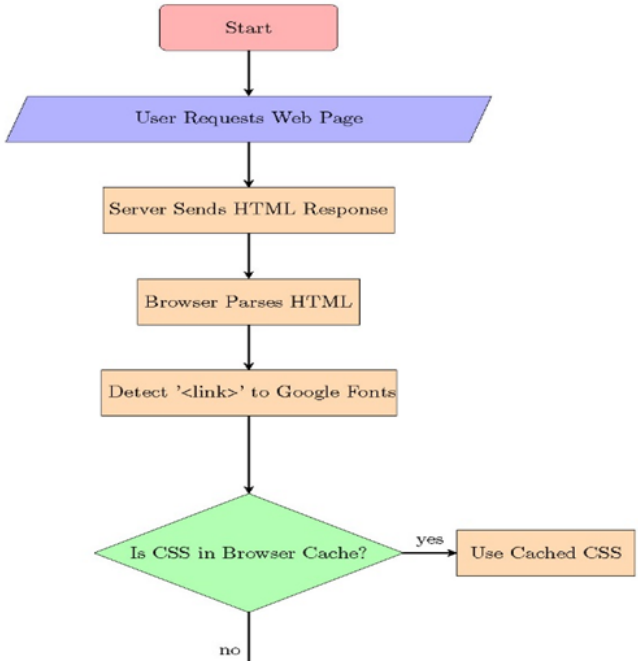


Figure 1.1. Example of how Google Fonts operates flowchart theoretically.

[16] Pierangela Samarati, and Sabrina De Capitani di. Vimercati. 2010. "Data Protection in Outsourcing Scenarios: Issues and Directions." *Proceedings of the 5th ACM Symposium on Information, Computer and Communications Security : 2010, Beijing, China, April 13-16, 2010*, 363.

[17] Alessandra Bagnato, Paulo Silva, Ala Sarah Alaqra, and Orhan Ermis. 2020. "Workshop on Privacy Challenges in Public and Private Organizations." In *IFIP Advances in Information and Communication Technology*, 576 LNCS:82–89. Springer.

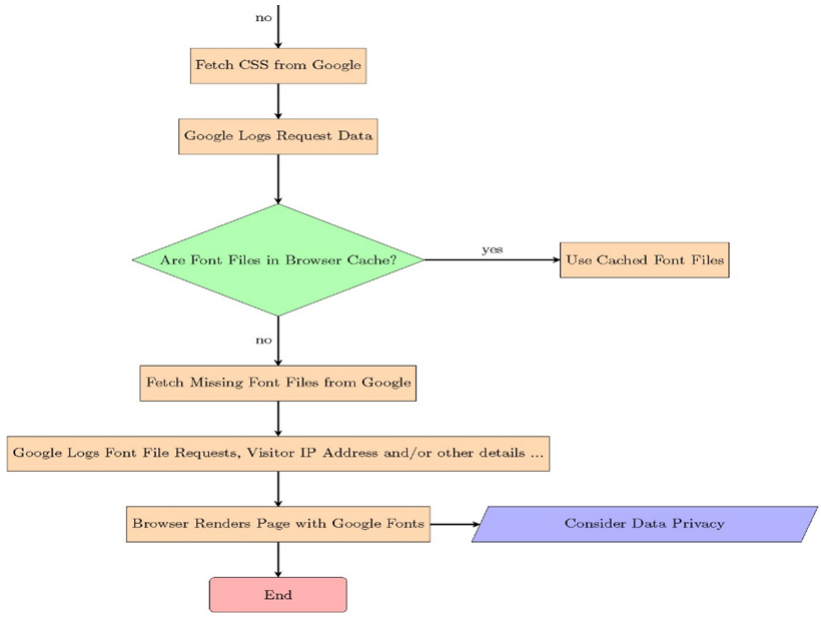


Figure 1.2. Example of how Google Fonts operates flowchart theoretically.

Figures 1.1 and 1.2 provide the flow of an example of how Google fonts are presented to the visitor from Google servers where both show a step-by-step flow diagram describing the transmission of the IP information of a web page visitor to Google servers and the scenario in which this visitor IP address is stored.

- User Visits Web Page: The user opens a web page in the browser.
- A request is made from the Web Page Server: The browser requests the server hosting the web page.
- HTML content is loaded into the browser: The HTML content of the web page is loaded into the browser.
- Google Fonts Link in HTML Recognized: The browser recognizes a reference to Google Fonts via the `<link>` tag in HTML or the CSS `@import` directive.

- The browser requests the Google Fonts API: The browser makes an HTTP request to the Google Fonts API. This request includes the user's IP address.
- Google Servers Receive and Process the Request: Google servers receive the request, record the user's IP address, and use it for statistical purposes.
- Font Files are Identified and Sent to the Browser: Google determines the desired font files and sends them to the browser.
- The browser loads fonts and displays them on the page: With the received font files, the browser displays text on the page in the specified fonts.

The process outlined in Figures 1.1 and 1.2 also highlights the potential privacy and data protection issues of outsourcing web pages. In particular, the transmission of the user's IP address to outsourcing servers and the recording of this information raises important issues in terms of data protection laws such as GDPR. Website owners and developers should act in a way to protect the privacy rights of users in such outsourcing.

Figure 2 shows an example of a site that brings the screenshot to the visitor by calling Google fonts from the Google server instead of its hosting panel.

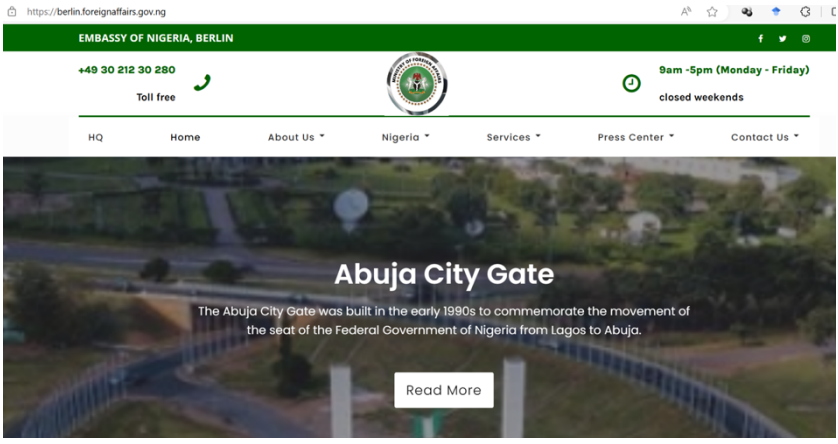


Figure 2. Sample website which uses google fonts.

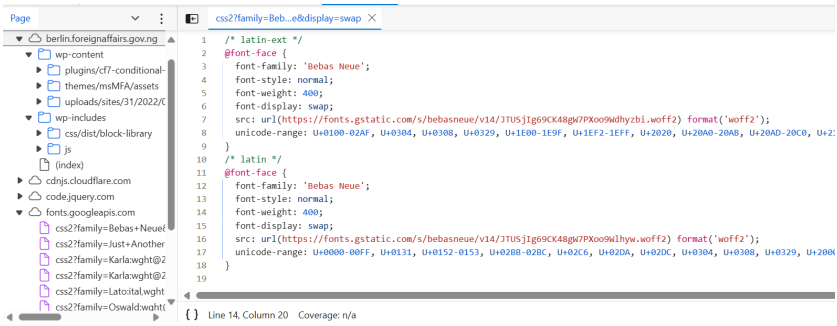


Figure 3. Example of a system that calls Google Fonts via Google Server.

According to Figure 3, where the source codes of the sample site are examined, the site brings the information from the Google Font server without the consent of the visitor, and in this case, it is seen that Google servers may have the address information of the end user. Based on this data, the end user data is shared to other servers other than the site itself, other than Google, without his consent. (Site address: https://berlin.foreignaffairs.gov.ng/ - Date: 2024-04-30-20:39 GMT 00:00 - IP: 197.159.70.171 - Page Title: Embassy of Nigeria, Berlin, Germany – Ministry of Foreign Affairs, Nigeria)

IV. Case and Decision

In consideration of the literature review, there are no academic articles about the violation of personal data by sharing the IP address information of the page users of the sites using the Google font without permission.[18] The first official case on this issue was filed in Germany.[19]

[18] "Verletzung Des Persönlichkeitsrechts Durch Datenschutzverstoß." 2022. https://www.gesetze-bayern.de/Content/Document/Y-300-Z-GRURRS-B-2022-N-612?hl=true.

[19] Jonas Knetsch. 2022. "The Compensation of Non-Pecuniary Loss in GDPR Infringement Cases." *Journal of European Tort Law* 13 (2): 132–53.

The case states that a German court fined an unidentified website €100 ($110, £84) for its unauthorized use of a web font hosted by Google. The court found that the website's use of the Google Fonts hosted font on its pages constituted an unauthorized transfer of the user's IP address to Google and ruled that this violated the European Union's GDPR.[20]

The website's use of the user's browser to retrieve a font from Google Fonts caused the user's IP address to be transferred to Google, constituting a violation of the right to information autonomy according to section 823, 1 BGB. The court pointed out that IP addresses represent personal data, as theoretically IP addresses are considered to be personal data and it is possible to identify persons, regardless of whether the website or Google has carried this out.[21]

According to the ruling, the website must stop providing IP addresses to Google and be threatened with a fine of €250,000 per infringement or up to six months of imprisonment for the continued unauthorized use of Google Fonts. The ruling emphasized that despite the widespread use of Google Fonts, websites must comply with EU data protection laws and can reduce legal risks if they host the fonts themselves.[22]

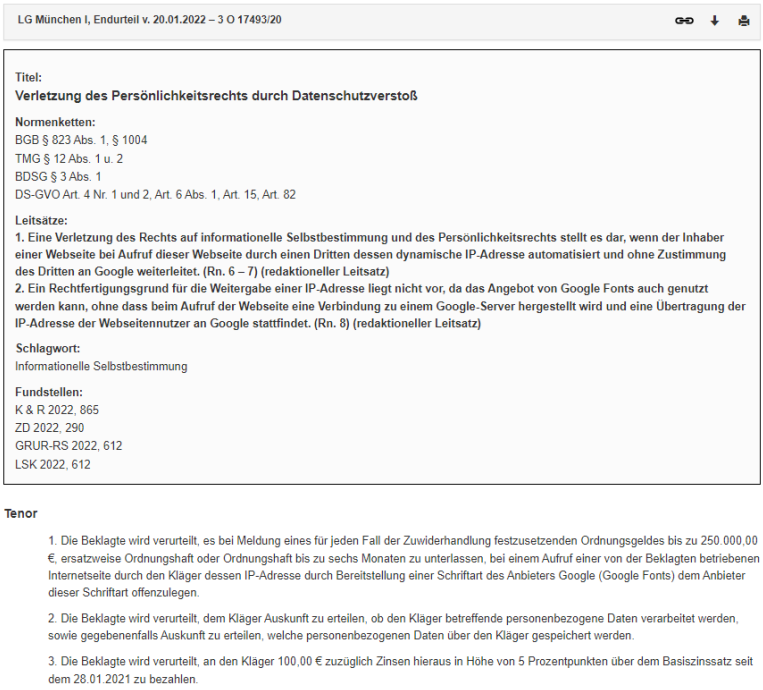
This ruling is in line with recent decisions by the Austrian data protection authority and another German court, emphasizing increased supervision over the transfer of personal data to companies outside the EU. These decisions emphasize that websites and practices must have a legitimate purpose to

[20] Ravie Lakshmanan. 2022. "German Court Rules Websites Embedding Google Fonts Violates GDPR."
[21] Ikeda Scott. 2022. "Leak of IP Address Via Google Fonts Prompts GDPR Fine - CPO Magazine." February 15, 2022.
[22] Juri Kanub, and Jens Eckhardt. 2023. "The Year of 'Google Fonts' Warning Letters | International Network of Privacy Law Professionals." March 1, 2023. https://inplp.com/latest-news/article/the-year-of-google-fonts-warning-letters/.

integrate remotely hosted content or services, highlighting the need to ensure compliance with EU data protection regulations.[23]

These decisions are part of the wider implications of the EU Court of Justice's decision to invalidate the Privacy Shield data protection framework in 2020. These legal developments highlight the evolving landscape in the data privacy space and the need for organizations to prioritize compliance with regulatory requirements to protect individuals' privacy rights.[24]

Figure 4 shows the details of the lawsuit filed on 20 January 2022 regarding the Google font and the decision in the original language.[25]



LG München I, Endurteil v. 20.01.2022 – 3 O 17493/20

Titel:
Verletzung des Persönlichkeitsrechts durch Datenschutzverstoß

Normenketten:
BGB § 823 Abs. 1, § 1004
TMG § 12 Abs. 1 u. 2
BDSG § 3 Abs. 1
DS-GVO Art. 4 Nr. 1 und 2, Art. 6 Abs. 1, Art. 15, Art. 82

Leitsätze:
1. Eine Verletzung des Rechts auf informationelle Selbstbestimmung und des Persönlichkeitsrechts stellt es dar, wenn der Inhaber einer Webseite bei Aufruf dieser Webseite durch einen Dritten dessen dynamische IP-Adresse automatisiert und ohne Zustimmung des Dritten an Google weiterleitet. (Rn. 6 – 7) (redaktioneller Leitsatz)
2. Ein Rechtfertigungsgrund für die Weitergabe einer IP-Adresse liegt nicht vor, da das Angebot von Google Fonts auch genutzt werden kann, ohne dass beim Aufruf der Webseite eine Verbindung zu einem Google-Server hergestellt wird und eine Übertragung der IP-Adresse der Webseitennutzer an Google stattfindet. (Rn. 8) (redaktioneller Leitsatz)

Schlagwort:
Informationelle Selbstbestimmung

Fundstellen:
K & R 2022, 865
ZD 2022, 290
GRUR-RS 2022, 612
LSK 2022, 612

Tenor

1. Die Beklagte wird verurteilt, es bei Meldung eines für jeden Fall der Zuwiderhandlung festzusetzenden Ordnungsgeldes bis zu 250.000,00 €, ersatzweise Ordnungshaft oder Ordnungshaft bis zu sechs Monaten zu unterlassen, bei einem Aufruf einer von der Beklagten betriebenen Internetseite durch den Kläger dessen IP-Adresse durch Bereitstellung einer Schriftart des Anbieters Google (Google Fonts) dem Anbieter dieser Schriftart offenzulegen.

2. Die Beklagte wird verurteilt, dem Kläger Auskunft zu erteilen, ob den Kläger betreffende personenbezogene Daten verarbeitet werden, sowie gegebenenfalls Auskunft zu erteilen, welche personenbezogenen Daten über den Kläger gespeichert werden.

3. Die Beklagte wird verurteilt, an den Kläger 100,00 € zuzüglich Zinsen hieraus in Höhe von 5 Prozentpunkten über dem Basiszinssatz seit dem 28.01.2021 zu bezahlen.

Figure 4. Official letter and decision (in original language)

[23] Thomas Claburn. 2022. "Website Fined by German Court for Leaking Visitor's IP Address via Google Fonts." January 31, 2022.
[24] Thomas Claburn. 2022. "Website Fined by German Court for Leaking Visitor's IP Address via Google Fonts." January 31, 2022.
[25] "Verletzung Des Persönlichkeitsrechts Durch Datenschutzverstoß." 2022.

During the preparation of the study, it is necessary to spend time to see where the fonts come from or whether they are hosted on localhost with web developer tools via the browser into a sample web page. To overcome this problem, an application has been developed in Python language to test whether a font is called to the screen with or without the consent of the visitor via the Google Fonts Server online within the web page entered, and the code example of this application is given in the appendix. When the application is run, if there are fonts brought from the Google server online on the site, what are these fonts and which fonts are used on which pages, and how many fonts are presented to the visitor from the site, the result of the output is reflected on the screen. A detailed screen view of the result is available in the appendix.

Consequently, for instance, 50 different Google fonts are presented to the visitor from the Google Fonts server without the consent of the visitor on a site belonging to a state institution outside the EU zone. In this case, while the use of this technique in a site outside the EU zone is not considered a crime under the laws of the relevant country, the visit of this site from a region within the EU zone may cause the site to be subject to litigation.

V. Results

In Germany, there is a notable case of a website operator being sued for breach of the GDPR due to the use of Google Fonts. A court in Munich ordered a website operator to pay €100 in damages for transferring users' data (i.e. IP addresses) to Google through Google's Fonts library without the user's consent. This was considered a violation of the user's privacy rights and the court stated that the website operator could identify "the people behind the IP address" by combining the collected information with third-party data.[26]

[26] Ravie Lakshmanan. 2022. "German Court Rules Websites Embedding Google Fonts Violates GDPR."

The decision ordered the website to stop disclosing the IP address by embedding the Google Fonts library and encouraged the company to share information about the personal data stored and processed with the aggrieved party. This comes a few weeks after the Austrian Data Protection Authority ruled that the use of Google Analytics violates the GDPR and criticized the transfer of visitor data to Google servers in the US, opening the door to potential surveillance by US intelligence services.[27]

These events complicate how websites and applications integrate remotely hosted content or services, requiring a legitimate purpose or obtaining legal consent in case personal data is transferred. This reflects the consequences of the EU Court of Justice's decision in 2020 to cancel the Privacy Shield data protection regulations, as well as the regulations allowing US companies to exchange data under the "Standard Contractual Clauses" allowing data exchange between EU and US companies.[28]

Moreover, website owners need to find various solutions to remain GDPR compliant, such as hosting Google Fonts locally or switching to system fonts. Such a change can significantly alter the look and feel of your website and should therefore be handled carefully.[29]

VI. Conclusion

This study discusses the challenges of website owners in the face of the European Union's GDPR and ways to overcome such challenges. In particular, the use of outsourced services such as

[27] Ravie Lakshmanan. 2022. "German Court Rules Websites Embedding Google Fonts Violates GDPR."

[28] Thomas Claburn. 2022. "Website Fined by German Court for Leaking Visitor's IP Address via Google Fonts." January 31, 2022.

[29] Daan van den Bergh. 2022. "Google Fonts Violates GDPR, German Court Rules. - Daan.Dev." February 1, 2022. https://daan.dev/blog/gdpr/google-fonts-violates-gdpr-germany/.

Google Fonts carries the risk of transmitting users' IP addresses to these service providers, which contradicts the principles of GDPR. In this context, the importance for website owners to ensure GDPR compliance and at the same time guarantee the protection of users' data was underlined.

Consequently, the use of outsourced services on websites, in particular services such as Google Fonts, should be carried out in compliance with data protection laws. To this end, it is recommended that website owners adopt solutions to host such fonts locally on their web servers and prevent the transfer of users' IP addresses to external providers. This approach both ensures GDPR compliance and is recognized as an effective method to protect user privacy. Therefore, website owners should reduce dependency on outsourced services by using their local resources in site design and content delivery, thereby optimizing both compliance with data protection standards and user experience.

This study aims to guide website owners on GDPR compliance and offers effective strategies for ensuring the protection of personal data by encouraging the use of local resources. These strategies should be considered as part of efforts to adapt to technological developments and changes in data protection laws.

Moreover, within the scope of the GDPR, there are different consequences for storing the IP address information of visitors in unwanted persons, institutions, sites, and similar places without their consent. The most important of these is that if the IP address information is not especially hidden or changed, it is possible to trace this information backward and thus there is a possibility of access to the physical location of individuals.

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Ferjaoui, Syrine. 2020. "Data: The New Form of Wealth and Power." *IEEE Potentials* 39 (6): 6–10. https://doi.org/10.1109/MPOT.2020.3016359.

Ghafarian, Ahmad, and Deniz Keskin. 2022. "Using Memory Forensics to Investigate Security and Privacy of Facebook." In , 581–601. https://doi.org/10.1007/978-3-031-10467-1_35.

Gore, Jessica. 2020. "A Type of Theft." *Available at SSRN 3792393*, December.

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Hoofnagle, Chris Jay, Bart van der Sloot, and Frederik Zuiderveen Borgesius. 2019. "The European Union General Data Protection Regulation: What It Is and What It Means." *Information and Communications Technology Law* 28 (1): 65–98. https://doi.org/10.1080/13600834.2019.1573501.

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APPENDIX

```
"""
File: GoogleFontsChecker.py
Author: Kazim ATES
Date: 2024-03-20 / 001
License: MIT
Description: This Python application is crafted to analyze the use of Google Fonts on a specified website.
It meticulously scans through each page of the website to identify
if Google Fonts are being served directly from Google's servers.
By fetching page contents with requests and parsing HTML with Beautiful Soup,
the application generates a comprehensive site map and lists all discovered Google Fonts
along with their usage across different web pages. This tool is particularly useful for web developers,
designers, and SEO experts who aim to audit or optimize font loading strategies for performance and consistency
across a website.
"""

import requests
from bs4 import BeautifulSoup
from urllib.parse import urljoin, unquote
import time
import urllib3

# Suppress SSL Warnings // SSL Uyarılarını bastır
urllib3.disable_warnings(urllib3.exceptions.InsecureRequestWarning)


def get_links_from_url(url, timeout=10):
    try:
        response = requests.get(url, timeout=timeout, verify=False)  # Disable SSL Verification // SSL doğrulamasını devre dışı bırak
        soup = BeautifulSoup(response.text, 'html.parser')
        links = soup.find_all('a', href=True)
        return [link['href'] for link in links]
    except Exception as e:
        print(f"Error fetching {url}: {e}")
        return []


def get_google_fonts_from_url(url, timeout=10):
    try:
        response = requests.get(url, timeout=timeout, verify=False)  # Disable SSL Verification // SSL doğrulamasını devre dışı bırak
        soup = BeautifulSoup(response.text, 'html.parser')
        style_tags = soup.find_all('link', rel='stylesheet')
        google_fonts = set()
        for tag in style_tags:
            href = tag.get('href', '')
            if 'fonts.googleapis.com' in href:
                font_params = href.split('?')[-1].split('&')
                for param in font_params:
                    if param.startswith('family='):
                        fonts = param.split('=')[1].split('|')
                        decoded_fonts = [unquote(font).replace('+', ' ') for font in fonts]
                        google_fonts.update(decoded_fonts)
        return google_fonts
```

```
except Exception as e:
        print(f"Error processing fonts for {url}: {e}")
        return set()


def generate_site_map(base_url, max_pages=50, delay=1):
    site_map = set()
    queue = [base_url]
    visited = set()
    while queue and len(site_map) < max_pages:
        url = queue.pop(0)
        if url in visited:
            continue
        visited.add(url)
        site_map.add(url)
        links = get_links_from_url(url)
        for link in links:
            absolute_link = urljoin(base_url, link)
            if absolute_link.startswith(base_url) and absolute_link not in site_map:
                queue.append(absolute_link)
        time.sleep(delay)  # Delay Between Requests // İstekler arası bekleme süresi
    return site_map


def main():
    url = input("Please enter the website address you want to visit: ")
    if not url.startswith(('http://', 'https://')):
        url = 'https://' + url
    site_map = generate_site_map(url)
    google_fonts_map = {}
    for page_url in site_map:
        google_fonts = get_google_fonts_from_url(page_url)
        if google_fonts:
            google_fonts_map[page_url] = google_fonts
    print("The following Google fonts are used on the visited sites:")
    total_fonts_count = 0
    for page_url, fonts in google_fonts_map.items():
        fonts_list = sorted(fonts)
        fonts_count = len(fonts_list)
        total_fonts_count += fonts_count
        print(f" - {', '.join(fonts_list)} ({fonts_count} fonts):\n - {page_url}")
    print(f"Total number of unique fonts used across all pages: {total_fonts_count}")


if __name__ == "__main__":
    main()
```

A site report observed as a result of the execution of the relevant code is available below, and according to the report, it was observed that the relevant site brought 38 different fonts from Google servers without the knowledge of the visitors.

```
C:\Users\Kazim\PycharmProjects\GoogleFonts_pythonProject\venv\Scripts\python.exe
C:\Users\Kazim\PycharmProjects\GoogleFonts_pythonProject\GoogleFontsChecker.py
Please enter the website address you want to visit: https://nurelconstruction.com/
The following Google fonts are used on the visited sites:
- Roboto:1,300,400,400italic,500,700,700italic|Lora:1,300,400,400italic,500,700,700italic (1 fonts):
  - https://nurelconstruction.com/project/nurel-12/
- Roboto:1,300,400,400italic,500,700,700italic|Lora:1,300,400,400italic,500,700,700italic (1 fonts):
  - https://nurelconstruction.com/iletisim/
- Roboto:1,300,400,400italic,500,700,700italic|Lora:1,300,400,400italic,500,700,700italic (1 fonts):
  - https://nurelconstruction.com/+90548 892 90 90
- Roboto:1,300,400,400italic,500,700,700italic|Lora:1,300,400,400italic,500,700,700italic (1 fonts):
  - https://nurelconstruction.com/kuzey-kibris/
- Roboto:1,300,400,400italic,500,700,700italic|Lora:1,300,400,400italic,500,700,700italic (1 fonts):
  - https://nurelconstruction.com/hakkimizda/
- Roboto:1,300,400,400italic,500,700,700italic|Lora:1,300,400,400italic,500,700,700italic (1 fonts):
  - https://nurelconstruction.com/projeler/
- Roboto:1,300,400,400italic,500,700,700italic|Lora:1,300,400,400italic,500,700,700italic (1 fonts):
  - https://nurelconstruction.com/project/nurel-21-bee-tower/
- Roboto:1,300,400,400italic,500,700,700italic|Lora:1,300,400,400italic,500,700,700italic (1 fonts):
  - https://nurelconstruction.com/en/projects/
- Roboto:1,300,400,400italic,500,700,700italic|Lora:1,300,400,400italic,500,700,700italic (1 fonts):
  - https://nurelconstruction.com/project/nurel-6/
- Roboto:1,300,400,400italic,500,700,700italic|Lora:1,300,400,400italic,500,700,700italic (1 fonts):
  - https://nurelconstruction.com/project/nurel-7/
- Roboto:1,300,400,400italic,500,700,700italic|Lora:1,300,400,400italic,500,700,700italic (1 fonts):
  - https://nurelconstruction.com/project/nurel-11/
- Roboto:1,300,400,400italic,500,700,700italic|Lora:1,300,400,400italic,500,700,700italic (1 fonts):
  - https://nurelconstruction.com/project/nurel-33-apartmani/
- Roboto:1,300,400,400italic,500,700,700italic|Lora:1,300,400,400italic,500,700,700italic (1 fonts):
  - https://nurelconstruction.com/project/nurel-20-apartmani/
- Roboto:1,300,400,400italic,500,700,700italic|Lora:1,300,400,400italic,500,700,700italic (1 fonts):
  - https://nurelconstruction.com/project/nurel-templos-villalari/
- Roboto:1,300,400,400italic,500,700,700italic|Lora:1,300,400,400italic,500,700,700italic (1 fonts):
  - https://nurelconstruction.com/project/nurel-5/
- Roboto:1,300,400,400italic,500,700,700italic|Lora:1,300,400,400italic,500,700,700italic (1 fonts):
  - https://nurelconstruction.com/project/nurel-34-apartmani/
- Roboto:1,300,400,400italic,500,700,700italic|Lora:1,300,400,400italic,500,700,700italic (1 fonts):
  - https://nurelconstruction.com/project/nurel-9/
- Roboto:1,300,400,400italic,500,700,700italic|Lora:1,300,400,400italic,500,700,700italic (1 fonts):
  - https://nurelconstruction.com/project/the-phoenix-towers/
- Roboto:1,300,400,400italic,500,700,700italic|Lora:1,300,400,400italic,500,700,700italic, Roboto:400|Arvo:400|Barlow Condensed:500,600 (2 fonts):
  - https://nurelconstruction.com/en/
- Roboto:1,300,400,400italic,500,700,700italic|Lora:1,300,400,400italic,500,700,700italic (1 fonts):
  - https://nurelconstruction.com/project/nurel-1/
- Roboto:1,300,400,400italic,500,700,700italic|Lora:1,300,400,400italic,500,700,700italic (1 fonts):
  - https://nurelconstruction.com/project/nurel-2/
- Roboto:1,300,400,400italic,500,700,700italic|Lora:1,300,400,400italic,500,700,700italic, Roboto:400|Arvo:400|Barlow Condensed:500,600 (2 fonts):
  - https://nurelconstruction.com/ru/
- Roboto:1,300,400,400italic,500,700,700italic|Lora:1,300,400,400italic,500,700,700italic (1 fonts):
  - https://nurelconstruction.com/ru/projects/
- Roboto:1,300,400,400italic,500,700,700italic|Lora:1,300,400,400italic,500,700,700italic (1 fonts):
  - https://nurelconstruction.com/project/nurel-4/
- Roboto:1,300,400,400italic,500,700,700italic|Lora:1,300,400,400italic,500,700,700italic (1 fonts):
  - https://nurelconstruction.com/project/nurel-sevilya-sitesi/
- Roboto:1,300,400,400italic,500,700,700italic|Lora:1,300,400,400italic,500,700,700italic (1 fonts):
  - https://nurelconstruction.com/project/nurel-3/
- Roboto:1,300,400,400italic,500,700,700italic|Lora:1,300,400,400italic,500,700,700italic (1 fonts):
  - https://nurelconstruction.com/project/nurel-the-shark/
- Roboto:1,300,400,400italic,500,700,700italic|Lora:1,300,400,400italic,500,700,700italic (1 fonts):
  - https://nurelconstruction.com/project/floral-homes/
- Roboto:1,300,400,400italic,500,700,700italic|Lora:1,300,400,400italic,500,700,700italic (1 fonts):
  - https://nurelconstruction.com/project/nurel-melis-alsancak/
- Roboto:1,300,400,400italic,500,700,700italic|Lora:1,300,400,400italic,500,700,700italic (1 fonts):
  - https://nurelconstruction.com/project/nurel-8/
- Roboto:1,300,400,400italic,500,700,700italic|Lora:1,300,400,400italic,500,700,700italic (1 fonts):
  - https://nurelconstruction.com/project/nurel-10/
- Roboto:1,300,400,400italic,500,700,700italic|Lora:1,300,400,400italic,500,700,700italic (1 fonts):
  - https://nurelconstruction.com/hizmetlerimiz/
- Roboto:1,300,400,400italic,500,700,700italic|Lora:1,300,400,400italic,500,700,700italic (1 fonts):
  - https://nurelconstruction.com/en/about-us/
- Roboto:1,300,400,400italic,500,700,700italic|Lora:1,300,400,400italic,500,700,700italic (1 fonts):
  - https://nurelconstruction.com/ru/about-us/
- Roboto:1,300,400,400italic,500,700,700italic|Lora:1,300,400,400italic,500,700,700italic, Roboto:400|Arvo:400|Barlow Condensed:500,600 (2 fonts):
  - https://nurelconstruction.com/
Total number of unique fonts used across all pages: 38

Process finished with exit code 0
```

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