IMPROVING THE UNIVERSITY RECRUITMENT PROCESS WITH WEB ANALYTICS

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Purpose: The main aim of the article is to know the information needs of candidates for university courses and indicate the importance of web analytics tools in the university recruitment process. The authors present the recruitment process for data science high study programme that was conducted in the middle of 2021 at one of the biggest universities in eastern Poland.

Theoretical background: Digital transformation is an irreversible process today. Data produced by people, things, administration units and business organizations can be the source of valuable information. That transformation causes new possibilities for fast development, but also creates challenges for education processes and professional work. Furthermore, the digital transformation resulted in creating new professions like data science (DS). Because of data volume and its importance DS professionals became one of the most wanted specialists in the 21st century, and therefore many universities try to launch new study programs related to automated data processing and try to get the attention of potential students.

Design/methodology/approach: The process was supported with analytics tools Hotjar and Google Analytics. The results presented in the paper base on the analysis of 974 pageviews recorded by Hotjar and activity of 824 page users reported by Google Analytics.

Findings: The analysis showed that web analytics tools are very easy to use in the recruitment process, and that gathered data allows for better understanding of candidates' needs and improving the future requirement processes and tools. Results indicated that the most important topics for candidates were study programme and payment. Form the technical point of view the responsiveness of applications used for the recruitment process is crucial because a lot of traffic was generated by both users of desktop computers and mobile devices. The greatest interest in the program was recorded before the holiday months.

Originality/value: The research contributes to academia in the field of recruitment. Paper presents the data science high study programme and indicates the importance of web analytics tools in the university recruitment process.

Keywords: data science, data science education, eMarketing, web analytics, heatmap, recruitment.

1. Introduction

The Internet technology gives broad possibility to share the information all over the world. It allows also for discovering and monitoring the internet users. Using web analytics, the website activity can be tracked and monitored in order to discover the users (potential clients) preferences and needs. The monitoring leads to better organization of promotion, better adjustment of the offer and form of presentation to the needs of the recipients. Nowadays, web analytics can be used in many business areas and for different purposes, including traffic monitoring, e-commerce optimization, marketing/advertising, web development, information architecture, website performance improvement, web-based campaigns/programs (Zheng and Peltsverger, 2015).

Increasing volume of digital data and huge number of open data sources require new methods and tools for its processing. Data science has recently become a revolutionary technology highly wanted by the organizations. Lack of data science experts will sooner or later have very serious consequences for organizations. Business needs analytical tools operated by skilled personnel to extract insights from unstructured data. The data scientist role is becoming increasingly important as businesses rely more heavily on data analytics to drive decision-making as core component of their IT strategies.

Data scientist is positioned as one of the top jobs as far as salary, work demand, and job satisfaction are considered. Therefore, universities are introducing and promoting new study programs related to digital economy like cybersecurity, data science, artificial intelligence. These programs should allow for meeting inspiring academic staff (leading experts), learning the methods and techniques of agile project management, learning frameworks for automated data analysis and sophisticated Python/R tools and finally give opportunity to work as a data science specialist or team leader.

Before the course participants take part in study programme and learn about its valuable content, it is necessary to attract their attention and understand their needs. Recruitment managers continually seek for innovative, cost effective and reliable tools for improving recruitment process.

Data science market is changing very fast therefore, also the recruitment process should be flexible and effective. It is necessary to support it with eMarketing tools and web analytics platforms. Also, the requirements and needs of study candidates are evolving rapidly, therefore analysis based on data collected by the web analytics tools should result in constant improving the recruitment processes to interest and attract potential students.

In this article the authors present methods and tools used for promotion the data science course. The program is provided for master's students and its promotion was supported with web analytics tool Hotjar and Google Analytics. The next parts of the article are organized as follows: In Section 2, literature review, theoretical background related to using web analytics

in students' recruitment process is presented. Section 3 contains the description of used tools and promotion process. In Section 5 study methodology was outlined: research questions, research procedure and the research sample. Section 5 presents the results addressing the stakeholders information needs, geographical scope and interest over the time, followed by a discussion of implications and list of recommendations. Finally, in Section 6, conclusions and in Section 7 suggestions for future work are developed and proposed.

2. The theoretical background

The literature describes many cases of exploring user-web interactions via web analytics (Saura et al., 2017; Jansen, 2009; Kinley and Tjondronegoro, 2012; Zheng and Peltsverger, 2015; Gonçalves and Ramasco, 2008; Thushara and Ramesh, 2016) and using web analytics tools in the recruitment process (Crall et al., 2017; Palos-Sanchez et al., 2018). Many articles also address development of web analytics key performance indicators that can be used on a specific market or by various organizations (Fagan, 2014; Bekavac and Garbin Praničević, 2015; Shaytura et al., 2017; Saura, 2021). However, there are only a few recent publications addressing the web analytics of university recruitment process.

Applying web analytics tools to students' recruitment marketing was explored in the articles published mostly in the last decade. Biella (2013) examines the Google Analytics usefulness in gaining attention of candidates' for studies. He concludes that web analytics tools allow for identifying which media in marketing mix are giving better results and can increase the student enrollment. Smith (2015) addresses using Google Analytics to improve the college website as a student recruitment tool. She prepared the instructional video tutorials that can be used by higher education professionals to make data-driven decisions in optimization of the recruitment website. The dissertation prepared by Neal (Neal, 2020), reports the results of monitoring the university webpage with Google Analytics. The author concludes that webpage visitors use different hardware platforms, but mostly desktop computers and that the highest number of page visits was in the middle of the week (Neal, 2020).

An interesting case of using web analytics and social listening to attract international students was presented by Tripathi. The author stresses that international students are valuable educational and economic contributions in higher education institutions and should be attracted in the recruitment process. He proposes developing a guide for education institutions to draw the interest of international students through web analytics and social listening. The author indicates that internet tools used for recruitment should be constantly monitored, but also the important is to read and analyze the on-line students' discussions related to the university (Tripathi, 2021). Research performed by Mocan and Maniu is focused on trends in higher education marketing, recruitment and technology. They stated that top trends in this area

include website design, search engine optimization, web analytics, but also developing mobile applications and SMS communication (Mocan and Maniu, 2015).

Finally, students' behavior in an adaptive e-learning system was explored by Moissa et al. They used web analytics to collect and visualize data about usage of e-learning platform. They tested the developed tool on two courses and state that there is a need for supplementing web analytics systems with recommendation tool that help the managers take appropriate steps to better adapt internet tools used for communication and promotion (Moissa et al., 2014).

Although in the literature we can find some examples of using web analytics tools for improving the recruitment process, there is still not many papers addressing supporting the students' recruitment process with the internet tools and monitoring user-web interactions during the university recruitment process. Therefore, in the next parts of the paper the authors present the characteristics of simple recruitment landing page and the possibility of use Hotjar and Google Analytics for monitoring and improving the recruitment procedure on the example of international study program in data science.

3. Recruitment process and tools

Recruitment process

Developing countries like Poland can gain a lot from using ICT tools. They have a great chance to promote their economy, businesses, education, and increase the effectiveness of conducted processes. The COVID pandemics has increased the role of ICT both in business, administration, and educational organizations. The market became global. Therefore, the organizations have to use tools and methods to attract global partners or clients. They must increase the scope of influence, which is not possible today without the use of internet technologies. Also, the Polish universities want to be recognized outside the country. They can achieve this goal in many ways, e.g. by improving the quality of scientific work, better publications, attracting the foreign students with innovative study programs, starting cooperation with recognizable companies.

Considering the above Maria Curie-Skłodowska (UMCS) university supplemented its offer with a new program in data science. In Covid conditions it was particularly difficult because all activities aimed at promoting a new program and attracting foreign students had to be carried out only through internet channels. The attractiveness of the study based on program that included: data analytics in business, data integration for business intelligence, programming for data science, advanced data visualization, marketing analytics and decision making, agile project management, robotic process automation, explainable artificial intelligence, but also on cooperation with leading data analytics companies that provide the experts for conducting the

classes. However, before the course participants take part in study program and learn about its valuable content, it is necessary to attract their attention using appropriate promotion tools that allow for attracting international students.

During the Covid pandemics the promotion of recruitment process for data science program was performed mostly via internet channels. The developed content consisted of text materials, graphics and video materials Information about studies were available on:

- dedicated landing page https://datascience.umcs.pl/,
- university recruitment platform: https://rejestracja.umcs.pl,
- university main page: https://www.umcs.pl/,
- faculty main page: https://ekonomia.umcs.pl,
- Facebook profile: https://www.facebook.com/umcslublin,
- Instagram profile: @umcs_lublin,
- YouTube Channel: https://www.youtube.com/channel/UCJdeg7E2FxJlIv1euQACzng.

The promotion was conducted also with the use of special agents that were responsible for Easter Europe (Ukraine, Belarus) and India. According to data received form university recruitment office the main promotional activities were performed in May and then repeated in September.

The analysis presented in this article is based on the data about the usage of dedicated landing page https://datascience.umcs.pl/. To collect the data two eMarketing tools Hotjar and Google Analytics were used.

Used tools

Hotjar (Hotjar, 2021) is a powerful tool that can be used for monitoring the online users' behavior. It offers both analysis and feedback tools. Data collected by Hotjar can be presented in graphical/video form or downloaded in a text format for future analysis. The tool is used to improve the web site's user experience and performance. More information about Hotjar can be found on https://help.hotjar.com. Hotjar control panel is presented on figure Figure 1.
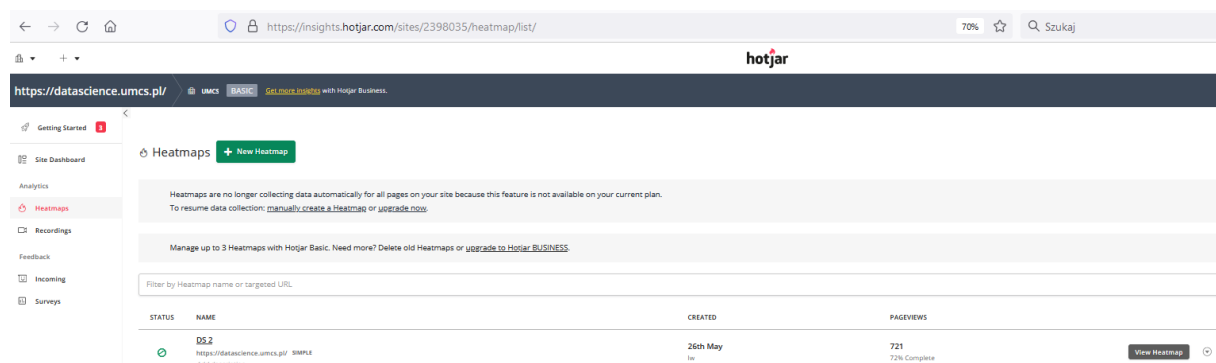

Figure 1. Hotjar control panel.

Google Analytics is service that tracks, analyze and report the website traffic. The service was launched in 2005, and it is one of the most widely used analytics tool. It also offers the mechanisms that can be used for monitoring the mobile application usage. In the recruitment process Google Analytics service was used mostly for collecting the data about geographic scope of promotional activities and interest in data science programme over the time. Sample report generated by Google Analytics based on prepared landing page was shown on Figure 2.
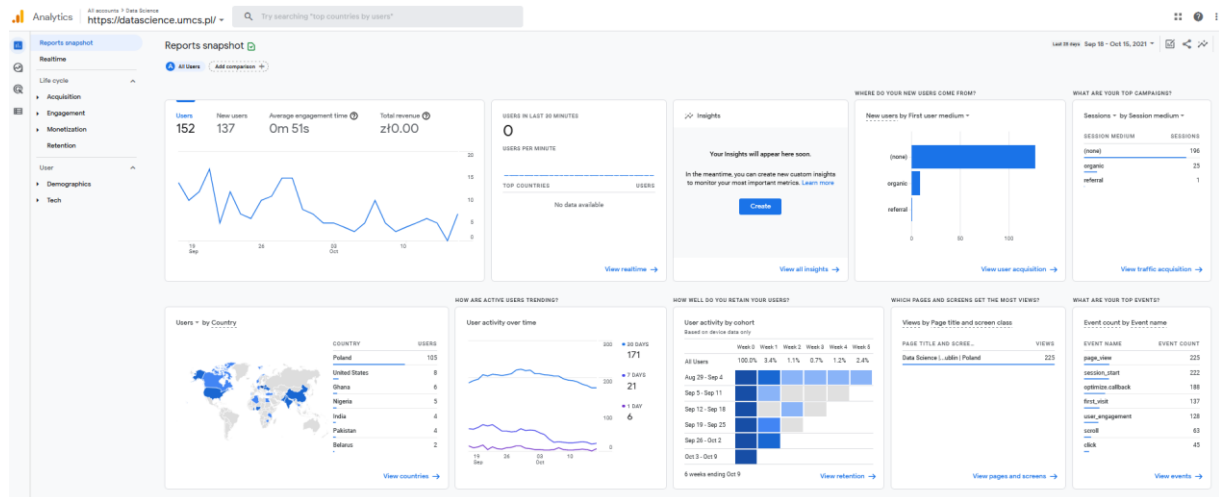

Figure 2. Google Analytics rapport based on data science landing page.

4. Research

4.1. The research questions

The data form data science program recruitment process was gathered in order to answer the following research questions:

- What is the most important information for participants of the recruitment process?
- What are the changes in the interest over the time?
- What is the geographical scope of interest?
- What technical aspects should be addressed during the electronic recruitment process?
- What actions should be taken to improve the recruitment process?

In order to answer these questions, the authors developed dedicated recruitment landing page, connected Hotjar application and Google Analytics to the webpage to monitor the users preferences via heatmaps and page statistics.

4.2. The research procedure

The research was divided into four main steps: preparing web page, data collection, data visualization, discussion, and final conclusions. The research procedure is shown on Figure 3.
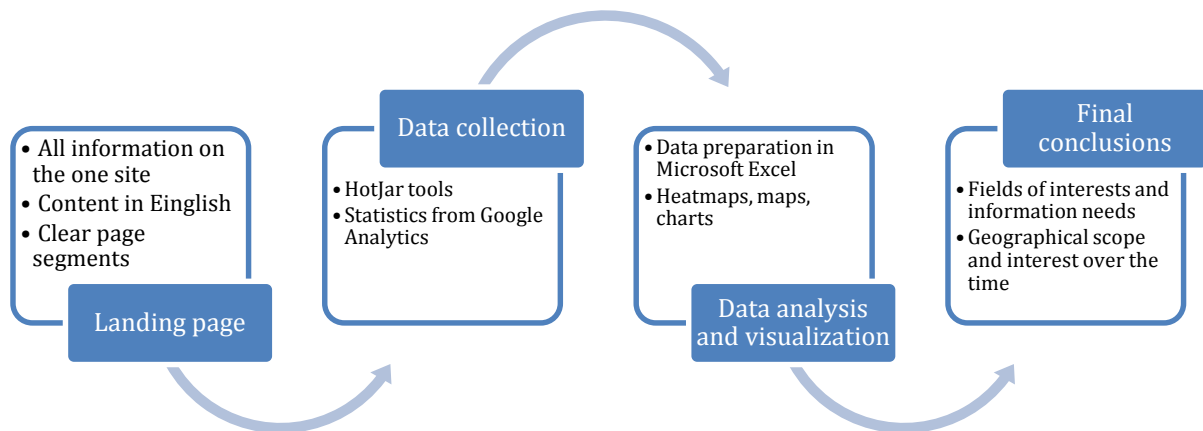

Figure 3. The research procedure.

In the first step the landing page (one site) containing synthetic information about Data Science programme was developed. Presented information and the page structure was prepared in accordance with the expectations of potential candidates and the lessons learned from the recruitment process in previous years. To collect the data about landing page visitors' authors connected the prepared landing page with Hotjar tool and Google analytics by inserting the tracking codes into the header of monitored web page. The data was collected during the entire recruitment process in 2021. Acquired data we analyze online using Google Data Studio and locally, in Microsoft Excel 365. Finally, we prepare and provide the interactive reports to the recruitment office to support them in managerial decision making and responding to changes during the process.

Figure 4 shows the component diagram of our system. The landing page https://datascience.umcs.pl/ provides the data to the analytical tools: Hotjar and Google Analytics. Hotjar records the interaction of the users with website and allows to understand how they behave during the session – this is an element of the behavioral analytics (IBM, 2013). The data is supplemented by data collected in Google Analytics, which allows us for recording information about the user profiles and their activities in time. For visualization purposes we use Google Data Studio which can be easily integrated with Google Analytics and it turns raw data into interactive reports, which provides better user interface for complex data.
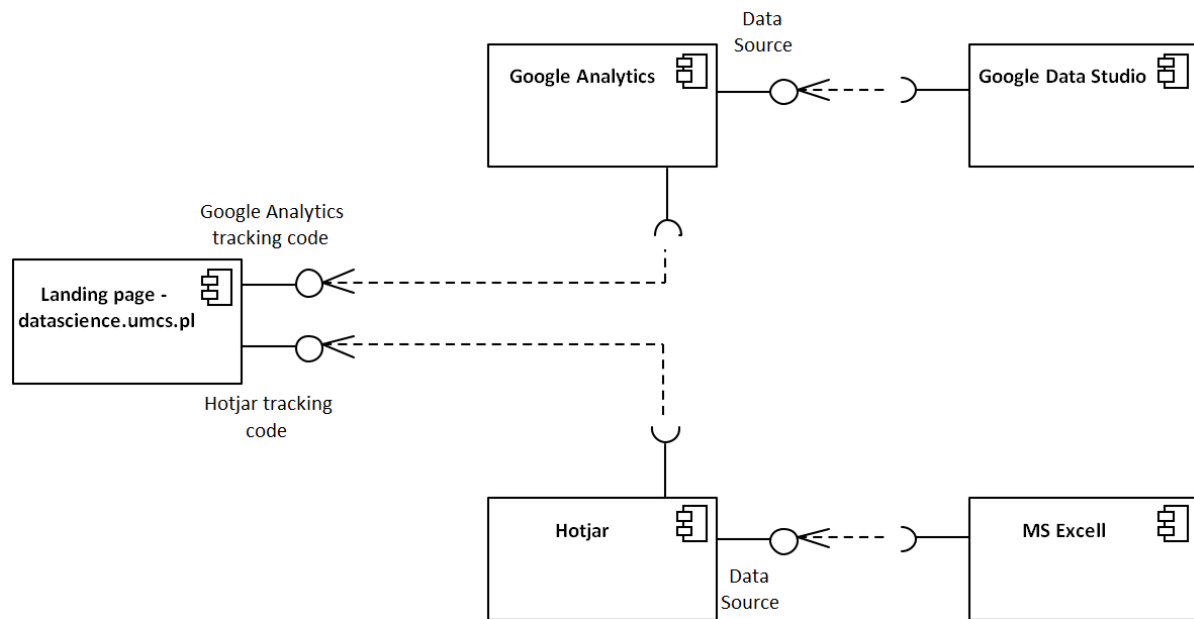
Figure 4. The component diagram of our system.

4.3. Collected data

The data were collected from 12th May till 17th September 2021. According to Hotjar during this period there were 974 pageviews. Generated both by desktop computers, tablets and mobilephone users. The Google Analytics reported 832 page users. The characteristics of page users was shown in Table 1.

Table 1.
The characteristics of page users

Attribute		Source	N	%
Used device	desktop	HotJar N = 974	597	61%
	tablet		16	2%
	mobile		361	37%
Country of origin	Poland	Google N = 832	597	72%
	Nigeria		33	4%
	Ukraine		26	3%
	United States		26	3%
	Belarus		20	2%
	India		16	2%
	China		12	1%
	Azerbaijan		8	1%
	Pakistan		5	1%
	Germany		4	1%
	Other		85	9%

Source: own work.

Landing page users used mostly desktop computers (61%), mobile phones were used by 37% visitors, only 2% were tablet users. Taking into account the country of origin the vast majority of guests came from Poland 72% more than 3% of traffic was generated by internet users form United States, Ukraine and Nigeria.

5. Data analysis and discussion

5.1. The most important information

The landing page contained only summary information about DS offer. It consisted of 673 words, twelve pictures and four movies. The page structure was divided into four sections: Why Data Science?, Studies Program, Fees, Contact. The interest in page section was shown on Figure 5.
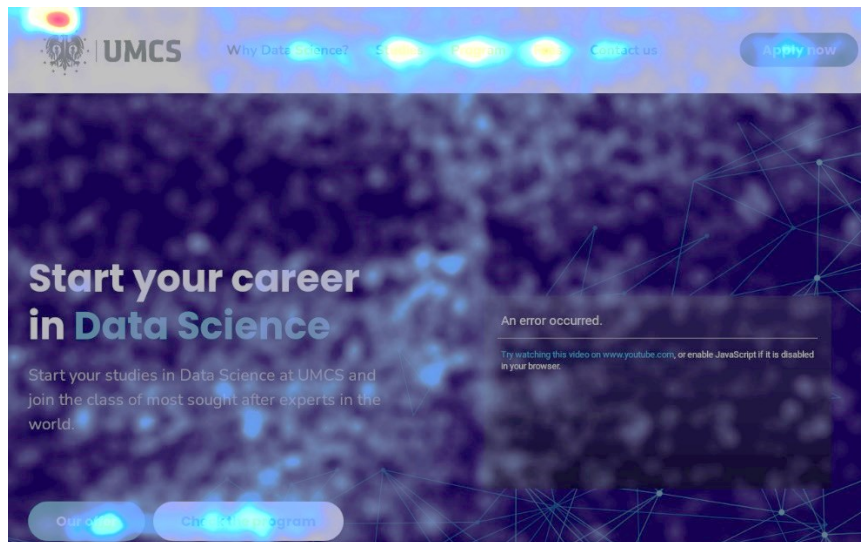

Figure 5. The most clicked page areas – heatmap desktop users.

We can notice that all buttons and links presented on the page were clicked or tapped, so they can be considered as needed. According to the heat map generated by Hotjar the most clocked (tapped) areas were Fees (6,6%) and Program (5,6%). Quite useful was also UMCS logo that allowed for returning to the beginning of the page, but it could be clicked because users thought it would take them to the university's homepage. Frequently used was also the Apply now button that allowed for study program enrollment with the use of the main enrollment system https://rekrutacja.umcs.pl.

The most important content, links to the page sections were placed at the beginning of the page. The Figure 6 showed that these elements were noticed by all page users. We can notice that page users didn't have to scroll much.

According to the Figure 6 we can also notice that scrolling over the page were performed in different ways by users of different types of devices. In every case the most visited sections were top part of the page, however tablet users used much more scrolling (orange color) to go to the next sections while desktop and mobile phone users used more frequently clicks (taps) in top menu to go to the appropriate page section.

The transitions between the colors are not sharp except form beginning of the page. That may indicate that some users wanted to read full page content by scrolling, while other used the top menu do visit the right section.
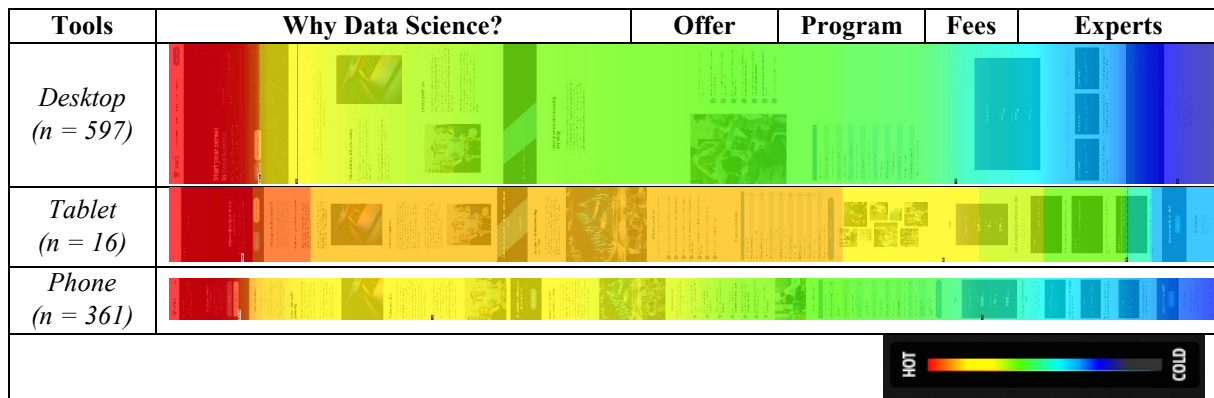
Tools	Why Data Science?		Offer	Program	Fees	Experts
Desktop (n = 597)						
Tablet (n = 16)						
Phone (n = 361)						

Figure 6. Scrolling over the page.

The analysis indicates that the page structure was prepared in accordance with the users needs. They could quickly find the interesting information using top menu or scroll the page. Therefore, the most crucial sections: Program and Fees were presented at the end of the page.

The analysis of % of page scroll performed by users working on different devices shows that only 10% of both desktop, tablet, and phone page visitors scrolled till the end of page. Slightly over 60% of mobile phone and desktop users reached half the page by scrolling. The most scrolling operations were performed by tablet users.
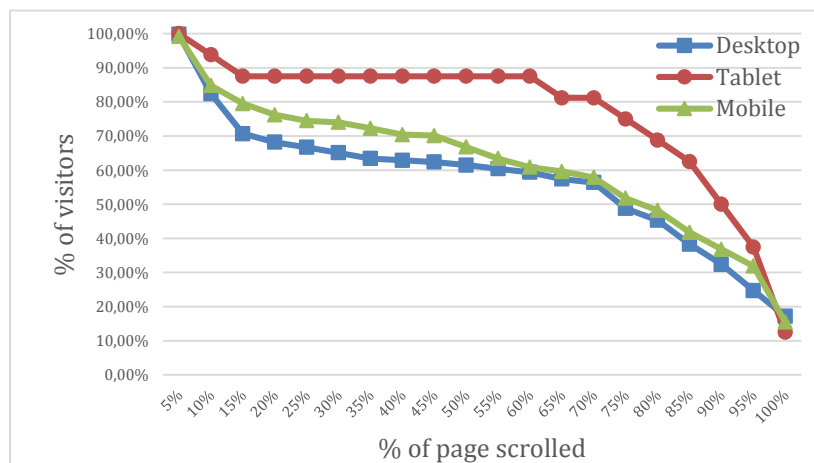
Figure 7. Scrolling over the page.

5.2. Geographic scope of interest

The data science program was developed to attract the foreign students. The studies are paid and conducted in English. Also, the materials published on landing page and other promotion channels were in English. Google Analytics showed (Figure 8) that overwhelming number of users came from Poland (over 60%), while the most represented foreign countries Nigeria, Ukraine and United states had respectively (4%, 3% and 3%). All the foreign traffic on the page was slightly below 40%. That may indicate that despite the promotional activities undertaken, not too many foreign students were reached. So, the managers responsible for the promotion should think about using other, more international communication channels.

Figure 8. Page users by country.

From the other site the topics addressed in the study program, and possibility to improve the English language skills may turn out to be interesting for Polish students. Therefore, despite having to pay fees, they decided to read the terms of recruitment. The high position of Ukraine, Belarus and India could be due to using special promotion agents that were responsible for attracting students form Easter Europe and India.

Interesting is also the huge interest in study program generated from Nigeria. However, a deeper analysis of this phenomenon requires additional data from e-mail communication and interviews with candidates, which now is not available for the authors.

5.3. Interest over the time

The landing page was launched in May 2021. The Google Analytics page usage over the time (Figure 9) indicates that the most traffic was generated in May and June, that is, right after launching the website. In the next months from July to September we cannot observe significant increases or decreases. In these months we can observe up to ten new users per day.
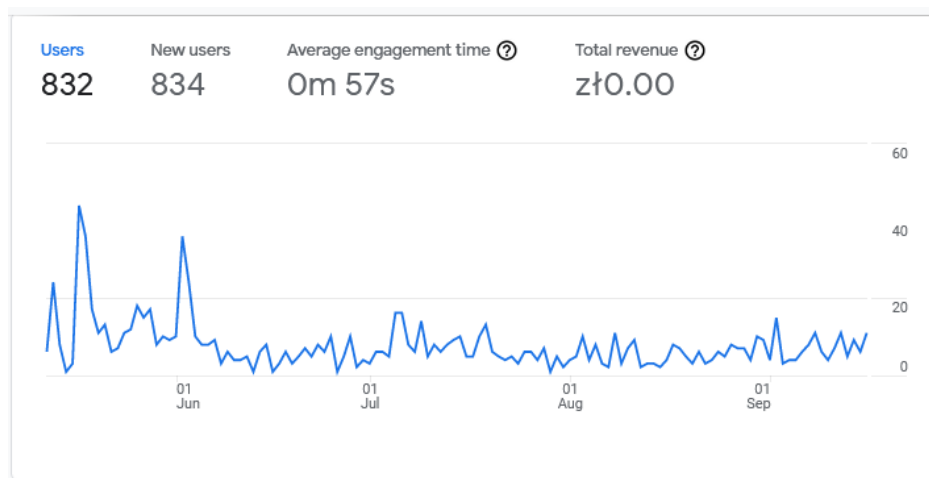

Figure 9. Page usage over the time.

The reason for that may be derived from two facts. First, at the beginning of the recruitment process the promotional efforts and activities were much bigger than in the next months of recruitment. Thus, we can conclude that promotional activities should be repeated over the time, preferably each month (or two) to attract new visitors. Second, we can connect the interest over the time with the huge traffic generated from Poland. In Poland July and August are the holiday months and during this period the interest in educational programs can be minimal. The results indicate that recruitment processes and their promotion should by started before the holidays (May seems to be an appropriate month), however the marketing campaign should be repeated after the holiday, preferably at the beginning of September to gather enough students and start the course in October. According to the information received form university recruitment office the main promotional activities were performed in May and then repeated in September. We can see more interest in data science program in May and June, however after the however, interest decreased in the summer months and did not increase in September. This could indicate that it is necessary to undertake additional promotional activities, especially in the autumn period.

5.4. Tools and software used by candidates

From the technical point of view, the important is also the knowledge about the hardware and the software used by the page visitors that many take part in the recruitment process. Google Analytics reports (**Figure 10**) indicate that the traffic is generated mostly by desktop computers and mobile devices users (99%). However, there were also some users equipped with tablets. The landing page should be available for all these devices, so responsive. It is worth mentioning that it is much easier to add responsiveness to simple landing page, than to the advanced recruitment portal. Responsiveness of every element of big portal is time consuming and expensive, finally some elements may be omitted. Therefore, it is wort to have responsive landing page to make a good impression and attract the student, and in the next step use the dedicated recruitment portal to complete a formal recruitment process.
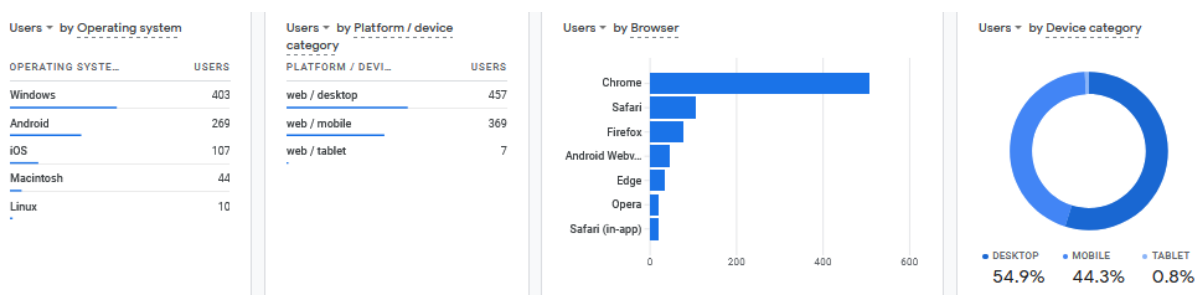

Figure 10. Tools and software used by page users.

When we want to attract international students, we must remember that they may use a diverse software: operating systems or browsers, which also affect the way the website is presented. The statistics (Figure 10) indicate that data science landing page visitors used both Windows (n = 403), Android (n = 269) and iOS (n = 107) operating system. The most used web

browser was Google Chrome, about 61%. Quite popular were also Safari and Firefox, respectively 13% and 10%. The variety of hardware and software indicate that the tools used in the recruitment should be not only responsive, but also tested with the tools that help to check the compatibility of the website with popular browsers.

5.5. Engagement of page users

Google Analytics and Hotjar also provides the reports and videos presenting the webpage users' engagement. Hotjar offers the video recordings of user sessions (Figure 11), while Google Analytics shows the tables with detailed characteristics of the sessions grouped by device, browser, or operating system (Figure 12).
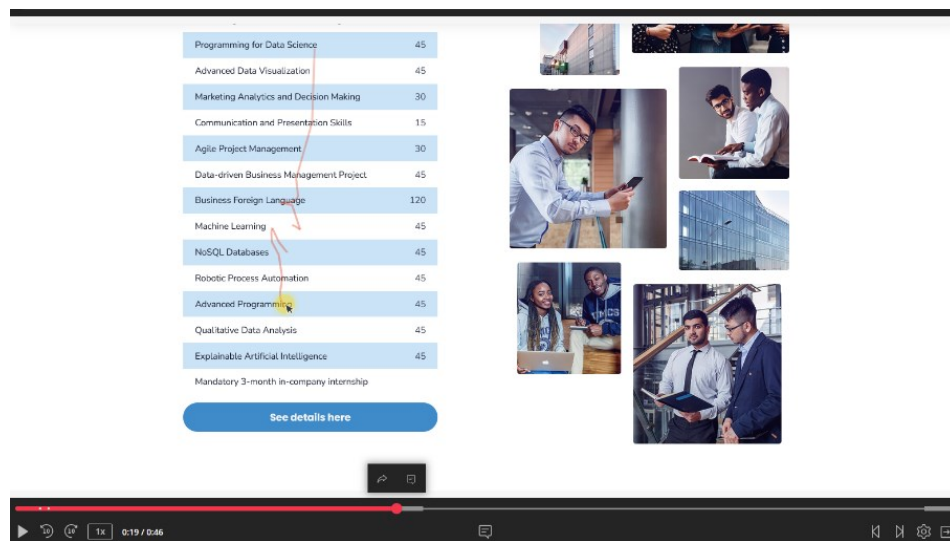

Figure 11. Sample user's session recording – Hotjar. Source: own work with Google Analytics.

Analysis of 100 recordings provided by Hotjar indicates that the sessions can be divided into three groups short (few seconds), medium (up to few minutes), long (dozen minutes and more). The most represented group was medium session about 70%. The recording analysis indicates that most was starting by clicking the "Check the program" button then reading the program of studies or checking the fees. That confirms the information presented on the landing page heatmaps.

Operating system ▾ ✛	↓Users	New users	Engaged sessions	Engagement rate	Engaged sessions per user	Average engagement time	Event count All events ▾
Totals	832 100% of total	834 100% of total	652 100% of total	56.79% Avg 0%	0.78 Avg 0%	0m 57s Avg 0%	5,671 100% of total
1 Windows	403	401	367	62.31%	0.91	1m 15s	2,974
2 Android	269	269	175	51.32%	0.65	0m 44s	1,643
3 iOS	107	109	61	45.19%	0.57	0m 24s	650
4 Macintosh	44	46	44	59.46%	1.00	1m 06s	361
5 Linux	10	9	5	55.56%	0.50	0m 20s	43

Figure 12. Users' engagement by operating system.

Engagement report provided by Google Analytics (Figure 12) indicate that sessions started by desktop computers were much longer than mobile phone users (respectively 1 minute 13 seconds and 36 seconds). The exception are Linux users who have very short sessions (about 10 seconds). The engagement rate (engaged sessions/total sessions) for the landing page is low (57%). The higher rate had desktop computer users (62%), while the engagement rate for mobile visitors was only 49%. According to engagement rate by industry report (Firstpagesage, 2021) in the education sector the engagement rate should be about 70%. The low engagement rate may indicate problems with page navigation or speed, but also the content may not grab enough readers' attention.

5.6. Recommendations

The performed analysis and information collected from mail contact with data science program candidates allow to formulate the recommendations for recruitment process managers. The recommendations address both the content posted on information pages and the monitoring of the recruitment process itself:

- it is worth to prepare dedicated domain and short landing page for promotion the study programs, especially in the COVID situation when traditional face to face contact is strongly limited;

- the dedicated English language webpage is extremely useful when we want to increase the geographical scope of promotion, however, to attract the global audience the landing page should be promoted through the channels with global reach;

- prepared web pages should be equipped with analytical tools, the integration process is very easy and, in many cases, free of charge, the collected data can be a source of valuable information, useful not only for real time page improvement but also allow for better adaptation of the offer to the profile and requirements of the candidates;

- during the implementation process of web communication tools, it is worth to check their responsiveness, and if they are properly displayed in different browsers, because the recruitment traffic is generated both by desktop computer and mobile device user, they use also various browsers;

- the heat maps, video recordings automatically generated by Hotjar software, are very transparent and can be used in the process of designing recruitment pages, their analysis allows not only to select the appropriate information, but also to place it in the appropriate sections.

6. Conclusion

To analyze the values the information needs and the interest in data science programme recruitment process the authors used data gathered by web analytics tools Hotjar and Google Analytics. The performed recruitment process monitoring allows formulating the conclusions addressing both promotion process, technical aspects of used tools, but also the way and the quality of presented information.

Due to the digital transformation stimulated by the Covid pandemics the usage of electronics communication tools in recruitment process is inevitable. Electronic communication channels increase the scope and allow for precise monitoring of user behavior and adaptation of the recruitment process (and the educational) offer to their needs. However, the used tools must be properly implemented and supervised.

Web analytics tools like Hotjar and Google Analytics are not expensive and quite easy to use. They collect the data automatically, however, need the experienced eMarketing specialists for initial customization and right and profound interpretation of the results.

According to the data acquired form the data science landing page analyzed in the article, the most interest in the recruitment process was noticed in May and June so before the summertime, and therefore it is recommended to start and support the recruitment process in the initial phase still during the semester and intensify/renew promotional activities after holidays. The page visitors are most interested in study programme and fees, and detailed questions addressing this area may be the subject of further email communication.

Developing the separate simple landing page generates many benefits, transparency, responsiveness, simpler monitoring, easier interpretation of results, however, it needs integration with the main recruitment portal, there may also be a risk of inconsistent information.

An important issue was also the introduction of a readable dedicated domain datascience.umcs.pl, which facilitated cooperation with SEO and increased readability for the recipients.

7. Future research

Web analytics tools allow to collect very useful data, however the in-depth interpretation often needs additional background information, therefore in the next stages of the research the authors are going to conduct the interviews with recruited students to find out what were the reasons for their interest in data science studies, how did they find out about the programme, and why they have chosen the university.

Finally, an interesting area of research is the comparison of students' recruitment needs between the universities form various countries, with different levels of information society development. It is also worth comparing the opinions of users of light, dedicated page (for single study programme) with complex tool used for whole university students' recruitment process.

References

1. Bekavac, I., & Garbin Praničević, D. (2015). Web analytics tools and web metrics tools: An overview and comparative analysis. *Croatian Operational Research Review, 6(2),* 373-386.

2. Bilella, J. (2013). Applying data mining and Google Analytics to student recruitment marketing. *Summer Academe: A Journal of Higher Education, 7(0),* 1-8.

3. Crall, A., Kosmala, M., Cheng, R., Brier, J., Cavalier, D., Henderson, S., & Richardson, A. (2017). Volunteer recruitment and retention in online citizen science projects using marketing strategies: lessons from Season Spotter. *Journal of Science Communication, 16(1),* A01.

4. Fagan, J.C. (2014). The suitability of web analytics key performance indicators in the academic library environment. *The Journal of Academic Librarianship, 40(1),* 25-34.

5. Firstpagesage (2021). *Google Engagement Rate characteristics*, https://firstpagesage.com/seo-blog/seo-basics/whats-a-good-engagement-rate-fc/, 2021.09.18.

6. Gonçalves, B., & Ramasco, J.J. (2008). Human dynamics revealed through Web analytics. *Physical Review E, 78(2),* 026123.

7. Google Analytics (2021). *Google Analytics help page,* https://support.google.com/analytics, 2021.09.17.

8. Hotjar (2021). *Hotjar home page*, https://www.hotjar.com, 2021.09.17.

9. IBM Software (2013). *Oh behave! How behavioral analytics fuels more personalized marketing, Enterprise Marketing Management*.

10. Jansen, B.J. (2009). Understanding user-web interactions via web analytics. *Synthesis lectures on information concepts, retrieval, and services, 1(1),* 1-102.

11. Kinley, K., & Tjondronegoro, D. (2010, November). *User-web interactions: how wholistic/analytic web users search the web?* Proceedings of the 22nd Conference of the

Computer-Human Interaction Special Interest Group of Australia on Computer-Human Interaction, pp. 344-347.

12. Mocan, I., & Maniu, G. (2015). Educational market: Higher education marketing strategies. Managerial Challenges of the Contemporary Society. *Proceedings, 8(1),* 92.

13. Moissa, B., de Carvalho, L.S., & Gasparini, I. (2014, June). *A web analytics and visualization tool to understand students' behavior in an adaptive e-learning system.* International Conference on Learning and Collaboration Technologies, 312-321. Cham: Springer.

14. Neal, B.D. (2020). *Web Analytics: Analyzing Users of a University Website*. Northern Kentucky University.

15. Palos-Sanchez, P.R., Saura, J.R., & Debasa, F. (2018). The influence of social networks on the development of recruitment actions that favor user interface design and conversions in mobile applications powered by linked data. *Mobile Information Systems,* 1-11.

16. Saura, J.R. (2021). Using data sciences in digital marketing: Framework, methods, and performance metrics. *Journal of Innovation & Knowledge, 6(2),* 92-102.

17. Saura, J.R., Palos-Sánchez, P., & Cerdá Suárez, L.M. (2017). Understanding the digital marketing environment with KPIs and web analytics. *Future Internet, 9(4),* 76.

18. Shaytura, S.V., Kozhayev, Y.P., Ordov, K.V., Antonenkova, A.V., & Zhenova, N.A. (2017). *Performance evaluation of the electronic commerce systems*. Revista Espacios.

19. Smith, J. (2015). *The use of Google Analytics to improve the College Website as a Student Recruitment Tool* (Doctoral dissertation).

20. Thushara, Y., & Ramesh, V. (2016). A study of web mining application on e-commerce using Google Analytics tool. *International Journal of Computer Applications, 149(11),* 975-8887.

21. Tripathi, R. (2021). *Use of Web Analytics and Social Listening to Attract International Students*. Global Perspectives on Recruiting International Students: Challenges and Opportunities. Emerald Publishing Limited.

22. Zheng, G., & Peltsverger, S. (2015). Web analytics overview. In: *Encyclopedia of Information Science and Technology* (pp. 7674-7683). IGI Global.