

THE USAGE OF MACHINE LEARNING IN MARKETING AUTOMATION TO IMPROVE THE PERFORMANCE OF THE DIGITAL MARKETING STRATEGY

¹REDOUAN ABAKOUCY, ²EL MOKHTAR EN-NAIMI,
³ANASS EL HADDADI, ⁴LOTFI ELAACHAK

^{1,2} E-DSAI2S Research Team, The Faculty of Sciences and Technologies, Abdelmalek Essaadi University, Tangier, Morocco

³ DSCI Team, ENSAH, Abdelmalek Essaadi University, Tetouan, Morocco

⁴ Data & Intelligent systems Team, FSTT, Abdelmalek Essaadi University, Tetouan, Morocco

E-mail: ¹redouan.abakouy@gmail.com, ²en-naimi@uae.ac.ma, ³anass.elhaddadi@gmail.com,

⁴l.elaachak@uae.ac.ma

ABSTRACT

The main objective of this research work is to develop Machine Learning (ML) algorithms to predict user needs based on customer data and past behavior. These predictions can be used to suggest offers based on the individual. ML can also allow marketers to use it to segment customers. The second objective of the study is to integrate the Marketing Automation process into the marketing strategy, and to study its impact on business performance focusing principally, on the effect on open rate, click rate, sales, and deliverability, as well as to identify the barriers that hinder the integration of this technology into the marketing strategy. The results reveal that marketing automation focuses on strategies that can be used to increase customer engagement and increase open rates, clicks, sales, and return on investment (ROI). Marketing automation improves the customer experience, optimizes time and resources relieving daily tasks such as message preparation and emailing, ensures consistency as the same activities will generate the same results, leads to optimization of the marketing strategy. It also allows decision-makers to reach customers with personalized content and intelligent and relevant segmentation.

Keywords: *Digital Marketing; Email Marketing; Machine learning; Marketing Automation*

1. INTRODUCTION

Email Marketing [2-7] represents one of the most popular and effective channels of digital marketing tools. Email marketing campaigns can help organizations retain their current customers, motivate them not to unsubscribe, convince the target audience to make an acquisition, by offering a personalized offer[14], based on the needs and desires of that person. Sending personalized offers has become an element of differentiation, but at the same time, an obstacle in the competition to attract new customers or to keep and retain existing ones. [1-9]. It allows sending the best offer to the right person at the right time, based on customer profiles. Generally, any email message sent by a company to a subscriber could be considered Email Marketing[12]. In 2015, a study conducted by Direct Marketing stated that Email marketing is used by over 90% of businesses and provides a cost-efficient and

powerful way for both broadcasting news and one-to-one communications, which boosts ROI, For every dollar, email marketing generates \$38 in ROI [27].

Marketing Automation[20-21-22-29] involves the automation of processes including customer data preparation, relevant segmentation and marketing campaign management. Effective implementation of marketing automation helps companies improve sales with reduced resource involvement, which ultimately results in cost reduction. In addition, automation can potentially help companies master customer behaviors and data, track the success of marketing campaigns, and deliver an effective marketing strategy. Marketing automation is seen as one of the strategic plans that allows companies to achieve significant market share. Marketing automation can be used by both small and large businesses to influence the buying decisions of target customers. Marketing automation can allow

companies to maximize productivity, optimize costs and increase ROI. Therefore, it can allow

A study by Murphy showed that companies are currently expected to implement a marketing automation system to maintain their competitiveness [20]. The implementation of this strategy will allow marketers to create customer-centric content. Marketing automation is becoming more and more a crucial aspect for decision makers, thus, companies need to invest considerably in this strategy.

Despite the many advantages of marketing automation that lead to the improvement of overall business performance, the implementation of marketing automation faces various difficulties, there is a lack of knowledge regarding the implementation challenges faced by companies [20]. Companies continue to leverage automation to reduce costs and increase the effectiveness and relevance of marketing campaigns. Some of the marketing automation strategies currently used by companies include email marketing. Artificial Intelligence (AI) has become a rising trend in science, business, education, medicine, automotive and marketing [8]. Marketing and marketing analytics are going through an evolution [16]. ML is one of the most protruding applications of Artificial Intelligence [18-32]. Therefore, this study aims to develop Machine Learning[6-13-15-23] algorithms to integrate the marketing automation process into the marketing strategy and study its impact on business performance focusing mainly on the effect on open rate, click rate, sales and deliverability, as well as the benefits on business performance.

Email marketing[10] consists in sending an email to a list of contacts (one to many). It usually serves a rather broad purpose, such as announcements of promotions, new products, a classic emailing campaign: the content is not targeted and does not respond to a specific action from the customer. On the contrary, marketing automation allows marketers to send automatic and targeted emails (one to one), triggered by specific actions of contacts. These messages are therefore more timely and individually calibrated for each recipient according to their progress in the customer journey. These emails, because of their relevance, are opened more frequently and can generate more traffic and revenue. Advertising practices and strategies have been researched extensively to enhance the effectiveness of advertisements across various target

companies to improve their competitive landscape.

audiences [17].

A marketer's worst enemy is tedious and repetitive tasks that prevent him from focusing on the big picture and long-term strategy. Hence the success of Marketing Automation, increasingly accessible, this technique can save valuable hours and quickly improve the experience and customer relationship. Marketing Automation refers to the automation of marketing campaigns triggered by a set of predefined conditions and based on user behavior.

About 20 years ago, Bucklin, Lehmann, and Little (1998) wrote that the role of technology in marketing should shift from "decision support to decision automation" by 2020. They predicted that a portion of marketing decisions will be automated because of the need for personalization, better decision making, and greater productivity [22]. Marketing automation consists of automating repetitive tasks that can be based on predefined conditions. These automated tasks are programmed within scenarios or workflows. Contacts enter a scenario from an entry point. They are then filtered according to conditions that take into account their identity (gender, age, number of purchases, etc.) or their actions. The scenarios consist of performing different tasks according to the characteristics of each customer.

The first step to automate a task is to set up a scenario. Each scenario starts with an entry point, which corresponds to the triggering condition of the scenario. Once a client enters a programmed scenario, the scenario unfolds either in a linear fashion or according to implication connectors ("if/then") that separate it into two branches that can themselves branch out in turn. Depending on the result of each condition (yes or no), different actions will be triggered towards each contact. It is possible to create any combination of conditions to create simple or complex scenarios that will automate email marketing.

The goal is to achieve better operational performance while increasing revenue. Nowadays, marketing automation has become a buzzword on which marketers have high hopes, while automation does not always deliver on its promises.

Marketing Intelligence and Automation[21] will allow marketers to create contact segments automatically. They can choose socio-

demographic criteria (gender, age range, family situation, geographical location, etc.), but also criteria from traffic analysis such as:

- The type of device used (mobile, desktop, tablet, device brand, etc.);
- The interactions with messages (email sent, email opened, clicked on a link, purchase...);
- Time/day of the action.

To automate procedures, technology is ready to change the marketing field. ML focuses on improving computer programs that can collect data, analyze it and use it to learn. Indeed, ML is a revolutionary technique in digital marketing[19]. Marketers can combine a multitude of criteria to create unique and highly targeted segments. Every time a customer updates the criteria for a segment, they are automatically added to that segment. Sending a non-personalized message to the list of subscribers runs the almost inevitable risk of landing in spam folders.

The critical problem with email marketing is the low customer engagement with the messages received, so the majority of emails are deleted without being read [11]. Sending mass campaigns to people who are not interested in the offer is likely to increase the rate of unsubscribes and spam complaints and the open and click rates will be very low, which will severely influence the deliverability of future campaigns. Data collection, analysis, and understanding of customer needs are at the core of marketing strategy and allow marketers to predict the effectiveness of marketing campaigns based on customer buying experience and personalized engagement. Among the objectives of the research is to enable marketers to reduce costs by studying the possibility of automatically and efficiently performing repetitive tasks without any errors and saving valuable hours, thus allowing decision makers to focus on the big picture and the medium and long-term strategy.

The adoption of AI in digital marketing has the potential to engender consumer insights and market intelligence through AI technologies such as Machine Learning[19]. This paper presents an automated solution for sending tailored marketing communications to individual customers in a timely manner. The contribution of the paper is the implementation of marketing automation and the use of segmentation models based on historical profile information between a company and its subscribers, followed by the development of classification algorithms to determine the best time to send marketing

communications.

Among the problems encountered in this research is the constraint of the deliverability of email marketing campaigns, so some messages do not arrive in the inbox of the client, this has influenced the result obtained negatively. In order to obtain a better correlation of the data and a better result, the marketing team must apply good practices to improve the deliverability. In this work, the accuracy related to the prediction of the timing of the opening of emails by customers could be better, to this end, in the next work; we will study the possibility of improving the results of the prediction of the right time to send advertising campaigns by integrating the different features.

2. METHODOLOGY

This work proposes, on the one hand, a marketing automation solution, and on the other hand, a service that automatically determines the best period of a time interval, i.e. the day of the week and the time of the day: T1 (00:00-02:00), T2 (02:00-04:00), T3 (04:00-06:00), T4 (06:00-08:00), T5 (08:00- 10:00), T6 (10:00- 12:00), T7 (12:00- 14:00), T8 (14:00- 16:00), T9 (16:00-18:00), T10 (18:00- 20:00), T11 (20:00- 22:00), T12(22:00-00:00), to send the right marketing message to the right customer, according to their profile. The system has the ability to segment subscribers based on their profiles and predict the best time to send marketing communications. Figure 1 shows the main steps to implement a Marketing Automation strategy.

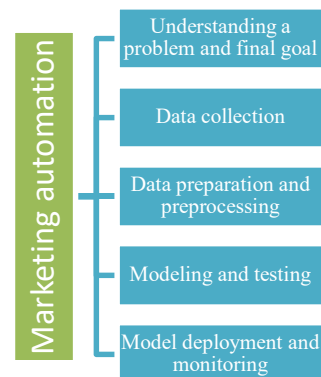


Figure 2: The major steps to implementation marketing automation strategy

Based on the data-driven [3-5] marketing approach, understanding the data at the heart of marketing strategy and decision making can enable marketers to automate repetitive tasks and predict marketing campaigns based on

customers' buying experience and personalized engagement. Thus, some of the biggest challenges in email marketing are driving engagement, increasing conversions and generating leads as well as optimizing ROI. In order to improve these metrics, and have a successful email marketing strategy, marketers must collect and analyze data.

The integration of AI with digital marketing provides a more comprehensive view of customer behavior, predictive analytics and deeper insights. With the implementation of technologies associated with AI, automated advertising has recently been able to provide more effective communication with customers at minimal cost, which will be the foundation of personalized marketing[29]. During this research work, we developed Machine Learning algorithms for segmentation of customers using their profile information[31], and for prediction of the best time to send marketing offers, while implementing a marketing automation system.

3. MODELLING

Machine Learning approach needs to help analyze the data to contribute in determining the marketing strategy policy. In this part of the research, we present the data collection and analysis used for the implementation of the marketing automation process, the prediction of the timing of the sending of advertising campaigns, as well as the segmentation of the data. The characteristics used in this work are described as follows:

- **Clientid**
- **Delivered_email**: Number of emails sent
- **Bounced_emails**: Number of emails bounced
- **Sent_days**: Emails sent in the day
- **Open_day**: The days when the email is opened
- **Open_time**
- **Offer**
- **Campaigned**
- **Listid**
- **Vertical**: Beauty, cash, health, legal, vacance, ..
- **Subject_line**
- **From_line**
- **Preheader**
- **Open_rate**
- **Click_rate**
- **Conversion_rate**
- **Clientip**
- **Country** : US, UK, NL, AU, ...
- **State**: California, ...

- **City**
- **OS** : iOS, Android, ...
- **Device** : iPad, PC, ...
- **Browser** : Chrome, ...
- **Domain**: yahoo.com, gmail.com, hotmail.com...
- **Geolocation**[30-34]

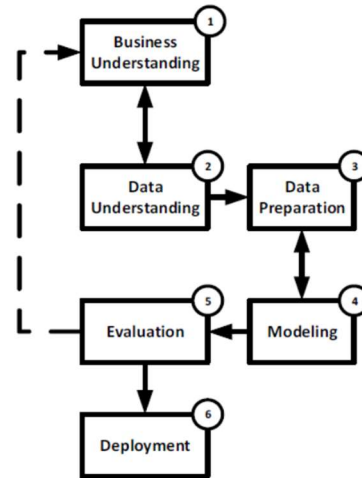


Figure 2: The research methodology of this study

This research aims to explore how marketers can improve the performance of their marketing campaigns. Thus, in this work, the objective was to implement Marketing Automation, to segment the data in a relevant and efficient way, as well as to find the significant variables for predicting the timing of email opening by customers. Text analysis is the practice of extracting meaning from text. The objective of this text analysis was to discover which keywords and combinations of keywords in the subject line and preheader of the email are associated with higher open rates. The feature selection process has a huge impact on the performance of an algorithm.

The figure 3 shows the opening rate of the emails according to the vertical of the advertising offer, the figure 4 shows the distribution of client actions by time of day. The figure 5 indicates the distribution of customer actions by day of the week, and finally, the figure 6 says the distribution of client actions by different device types, and the figure 7 shows the distribution of client actions by different operating system.

Vertical

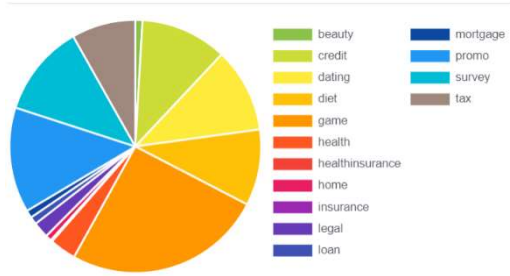


Figure 3: Opening emails by vertical

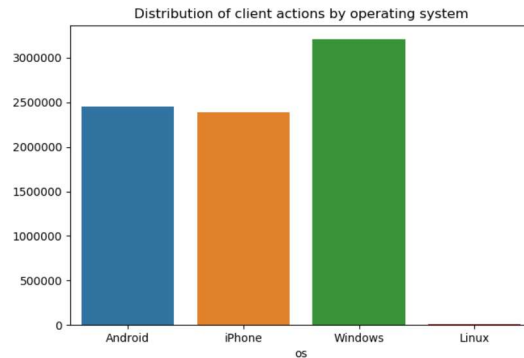


Figure 7: Distribution of client actions by operating system

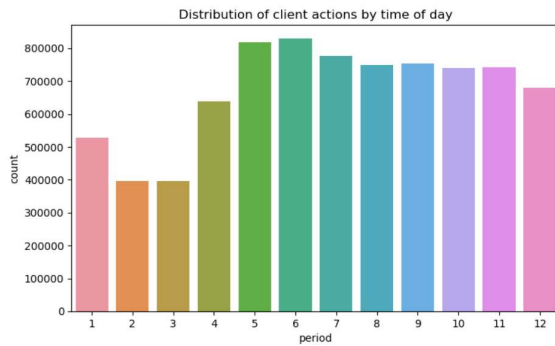


Figure 4: Distribution of client actions by time of day

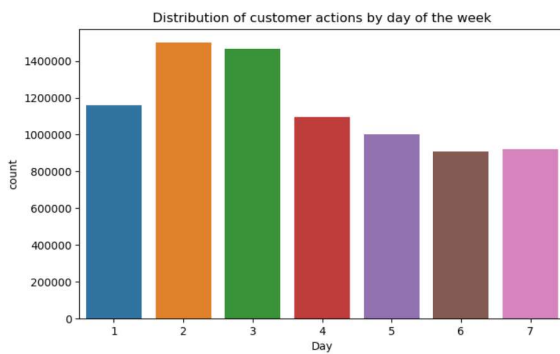


Figure 5: Distribution of customer actions by day of the week

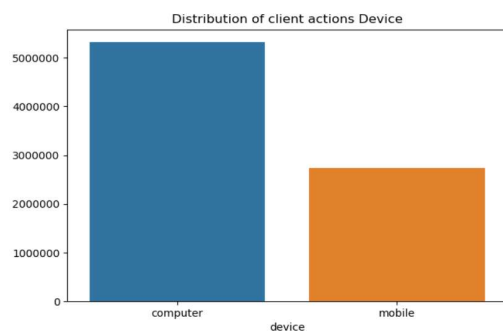


Figure 6: Distribution of client actions by device types

Therefore, it is important to determine which features are most appropriate for the target variable. To this end, the feature selection experiment performed a filter unnecessary features as input. The presence of redundant features does not add meaningful information to the existing feature set. by reducing the set of features, the execution time of the algorithm decreases significantly and, at the same time, the performance of the model increases [5].

Analytical tools rationalize strategic planning and help companies make operational decisions faster and more efficiently[24]. In this research, our datasets include a history of collecting customer actions on incoming emails. This process allowed us to extract campaign characteristics and build customer profiles. In this research work, we applied classification algorithms to predict the timing of customer actions. Each algorithm has its advantages and disadvantages, but the most important is that they all require a well-presented dataset for the creation of the model that will be able to accurately classify the tested data. To validate the performance of these models in new and unseen data, the 10-fold cross validation method was used.

Splitting the dataset, involves dividing the dataset into two different sets, the training set and the test set. Using Scikit-learn[33] function “train-test” to split dataset, a percentage of 80 and 20 was implemented for the training and test sets. This split is necessary to reduce the impact of data discrepancies on the models and to obtain an unbiased evaluation of prediction performance. The training was also validated using a time series cross-validation approach.

4. RESULTS AND DISCUSSION

In this study, we applied supervised learning to predict the right time to send advertising campaigns, so three Machine Learning algorithms were integrated for this purpose. The classification algorithms used were the following: Decision Tree, Naives Bayes and Random Forest [25]. It is often difficult to define whether one algorithm is better than the other, as judgments depend on several parameters including accuracy, type of data processed, learning time... The final model is a combination of accuracy and stability where, based on previous experience, we put more weight on stability. However, the Naive Bayes classifier proved to be more stable when tested on different samples. In addition, in order to segment the data we applied the Kmeans clustering algorithm. The work also allowed us to implement Marketing Automation, and to benefit from these advantages in the digital marketing strategy.

For the treatment of the problem of predicting the timing of marketing campaigns, we based ourselves on the F1 score which represents the weighting of the two factors (recall and precision) even on the rock curve. To evaluate each algorithm used, we used the AUC-ROC curve, which is a performance measure for a classification problem at different threshold parameters. The ROC is a probability curve and the AUC represents the degree or extent of separability. It shows how many models are able to differentiate classes. The higher the AUC value, the better the model is able to distinguish classes (a good prediction). The ROC curve is plotted with TPR (true positive rate) versus FPR (false positive rate), where TPR is on the y-axis and FPR on the x-axis.

Table 1: Confusion Matrix

		True Values	
		TRUE	FALSE
Prediction	TRUE	True Positive (TP) (Correct Result)	False Positive (FP) (Unexpected Result)
	FALSE	False Negative (FN) (Missing Result)	True Negative (TN) (Correct Absence of Result)

$$\text{Accuracy} = \frac{(TP + TN)}{(TP + FP + FN + TN)}$$

$$\text{Precision} = \frac{TP}{(TP + FP)}$$

$$\text{Recall} = \frac{TP}{(TP + FN)}$$

$$\text{F1 - score} = \frac{2 * (\text{Recall} * \text{Precision})}{(\text{Recall} + \text{Precision})}$$

Table 2. Machine Learning Algorithms for models establishment

Algorithm	Accuracy	AUC	F1-S
Decision tree	0.74	0.61	0.74
Naive Bayes	0.81	0.64	0.74
Random Forest	0.73	0.67	0.73

The novelty is that this work is the first research that studies the automation of the process of implementing email marketing campaigns, from its preparation and planning to its sending, by integrating supervised and unsupervised ML algorithms. According to the four coefficients "True Positive, False Positive, True Negative, False Negative" of the confusion matrix, it is possible to calculate precision, recall, F1 score, accuracy, etc.

In this work, the ROC curve of the decision tree algorithm, the AUC is equal to 0.61, which means that there is 61% chance that the model can distinguish between positive and negative classes.

Finally, and after fitting and training the three algorithms mentioned above, and according to the obtained results presented below in Table 1. we can see that the Naive Bayes classifier performs better in all scenarios.

This paper also focuses on the integration of unsupervised learning for customer segmentation using their profile information. The segmentation is performed using the K-Means clustering algorithm[1].

In order to improve the performance of the marketing strategy, to increase opens, clicks and

conversions, to optimize the resources and costs of the advertising campaigns, as well as to improve the return on investment, we have integrated the Marketing Automation process.

In 2022 C. Araújo, C. Soares, I. Pereira, D. Coelho, M. Rebelo and A. Madureira performed a segmentation of subscribers based on their behaviors and profiles. Their work also presents a parallel ensemble approach of trained regression algorithms to determine the best time to send marketing communications. The stacking model obtained the best performance, with an R2 score of 0.91[1].

In 2021, M. Goic, A. Rojas and I. Saavedra studied the impact of a type of triggered email campaign using an experimental approach, they also found that the implementation of triggered emails plays an important role in marketing campaign effectiveness. In the same context, their result indicated that retargeting based on longer browsing histories is associated with higher conversions[12].

In 2020, Wan Abdul Rahman, Wan Fariz... explored the primary use of artificial intelligence (AI) in digital marketing in terms of its potential to become a primary element of today's competitiveness. The basic concept of AI is presented to provide a thorough understanding of its application to marketing[29].

The results of our study, achieved that email marketing automation can increase customer engagement and increase opens, clicks, sales, and ROI. The advantage of this research compared to similar studies is that this work focuses on the automation of the entire email marketing process, from the preparation of campaigns to their launch at the right time. This strategy has allowed decision-makers to optimize time and resources by relieving daily tasks such as preparing messages and sending emails, minimizing human error and leading to optimization of the marketing strategy. This approach also enables decision makers to reach customers with personalized content and smart, relevant segmentation.

Comparing the results presented in Table 2, we found that the model with the best performance was Naive Bayes, when using the redundant feature selection technique. This model accurately predicted 81% of the observations, achieving approximately an AUC of 64% and an F1 score of 74%. We also integrated unsupervised learning for clustering the data. Finally we implemented marketing automation.

5. CONCLUSION

The major constraint of email marketing is low customer engagement with received messages, so majority of customers have a habit of deleting emails without being read, and sometimes they mark them as spam. Implementing massive irrelevant campaigns is likely to increase unsubscribe rates and spam complaints and reduce open, click-through and sale rates, which strongly influences the deliverability of future campaigns. Understanding customer needs is at the heart of marketing strategy and enables marketing decision makers to predict the effectiveness of marketing campaigns based on customer shopping experience and personalized engagement. The objectives of this research were to enable marketers to reduce costs by effectively automating repetitive tasks without any errors and saving valuable hours. This work thus allows decision makers to focus on the big picture and on the short, medium and long term of the marketing strategy.

The main priority of digital marketers is to create effective and relevant communications. Successful marketing campaigns result in higher open rates, higher click-through rates, and higher sales rates. One solution to this problem is to implement Machine Learning algorithms that allow for the automation of communications and ensure personalization for each subscriber. The automation strategy and integration of Machine Learning, driven by supervised and unsupervised learning algorithms, has allowed us to provide personalized communications and predict the best time of day to send them, with the goal of sending the right marketing offer at the right time to the right customer, based on historical customer actions, information, and behavior.

The research examined the potential effects of marketing automation on business performance. Marketing automation is the way to go for many reasons. One of the benefits of implementing marketing automation on an enterprise-wide basis is the reduction in personnel costs. This is made possible by the ability of marketing automation to efficiently perform multiple tasks without any errors, unlike error-prone humans. In addition to marketing efficiency, marketing automation generates additional revenue for the company and positively impacts customer engagement as well as deliverability of advertising campaigns. Therefore, automating customer flows, upsells and cross-sells increases the lifetime value of the

consumer.

Marketing automation focuses on using the extracted information to segment customers and ensure they receive offers appropriate to their needs and purchase potential. As a result, it is possible for marketers to establish personalized communication with customers about the right offer at the right time. Marketing automation improves customer loyalty and positively influences customers' purchasing decisions.

In digital marketing, the search for the best communication between customers and companies is growing. Marketers must respond to the needs of customers in a personalized and individualized way. This work proposes a system that automatically determines the best period of a time interval, i.e. day of the week and time of the day to send a marketing message to the individual client, based on their profile. The system has the ability to segment customers based on their profiles, predict the best time to send marketing communications, and integrate the marketing automation strategy.

Comparing the results presented in Table 2, we found that the model with the best performance was Naive Bayes, when using the redundant feature selection technique. This model accurately predicted 81% of the observations, achieving approximately an AUC of 64% and an F1 score of 74%. Recall for the relevant class was slightly lower. We also integrated unsupervised learning for clustering the data. Finally we implemented marketing automation. The segmentation is performed using the K-Means clustering algorithm.

Several constraints are encountered in this research, in particular the problem of the deliverability of email marketing campaigns, so some messages arrive in the client's spam, which has negatively influenced the results obtained. In order to get a better data correlation and a better result, we will work with marketers to apply the best practices guiding the improvement of the deliverability. Also, in this work, the accuracy related to the prediction of when customers open emails could be better, for this purpose, in future work; we will study the possibility of improving the results of the prediction of the right time to send advertising campaigns by integrating the different features.

REFERENCES

- [1] C. Araújo, C. Soares, I. Pereira, D. Coelho, M. Rebelo and A. Madureira: "A Novel Approach for Send Time Prediction on Email Marketing". *Appl. Sci.* 2022, 12, 8310. <https://doi.org/10.3390/app12168310>
- [2] E. Fariborzi and M. Zahedifard. "E-mail Marketing: Advantages, Disadvantages and Improving Techniques", *International Journal of e-Education, e-Business, e-Management and e-Learning*, Vol. 2, No. 3, June 2012
- [3] P. Sundsøy, J. Bjelland, A. M. Iqbal, A. S. Pentland and Y-A. d. Montjoye. 2014. "Big Data-Driven Marketing: How machine learning outperforms marketers' gut-feeling", *Social Computing, Behavioral-Cultural Modeling & Prediction. Lecture Notes in Computer Science*, 8393 (2014), 367-374Ding, W. and Marchionini, G. 1997. A Study on Video Browsing Strategies. Technical Report. University of Maryland at College Park.
- [4] Luo, X., Nadasabapathy, R., Zincir-Heywood, A.Nur, Gallant, K., Peduruge, J.: "Predictive analysis on tracking emails for targeted marketing". In: Japkowicz, N., Matwin, S. (eds.) *DS 2015. LNCS (LNAI)*, vol. 9356, pp. 116–130. Springer, Cham (2015). https://doi.org/10.1007/978-3-319-24282-8_11
- [5] A. Conceição, J. Gama: "Main Factors Driving the Open Rate of Email Marketing Campaigns". P. Kralj Novak et al. (Eds.): *DS 2019, LNAI 11828*, pp. 145–154, 2019. Springer Nature Switzerland AG 2019. https://doi.org/10.1007/978-3-030-33778-0_12
- [6] A. De Mauro, A. Sestino, A. Bacconi. "Machine learning and artificial intelligence use in marketing: a general taxonomy". *Italian Journal of Marketing* <https://doi.org/10.1007/s43039-022-00057-w>
- [7] F. SABBAGH. "Email Marketing: The most Important Advantages and Disadvantages", *Journal of Economics and Technology Research* ISSN 2690-3695 (Print) ISSN 2690-3709 (Online) Vol. 2, No. 3, 2021, www.scholink.org/ojs/index.php/jetr
- [8] S. P. Devarapalli, "Artificial Intelligence in Marketing", January 2022, https://www.researchgate.net/publication/357811698_Artificial_Intelligence_in_Marketing
- [9] R. I. Mogoş, C. Acatrinei, "DESIGNING EMAIL MARKETING CAMPAIGNS - A DATA MINING APPROACH BASED ON CONSUMER PREFERENCES". *Annales*

- Universitatis Apulensis Series Oeconomica, 17(1), 2015, 15-30
- [10] P. Carmen, P. Al. Nicolae. "EMAIL MARKETING CAMPAIGNS: THE EASIEST PATH FROM ORGANIZATIONS TO CONSUMERS – AN EXPLORATORY ASSESSMENT". IDEAS/RePEc search, Vol.1 p:737-742 ()
- [11] M. Andersson, M. Fredriksson and A. Berndt. 2014. "Open or Delete: Decision-makers' Attitudes Towards E-mail Marketing Messages", *Advances in Social Sciences Research Journal*, 1 (2014)
- [12] M. Goic, A. Rojas and I. Saavedra. "The effectiveness of triggered email marketing in addressing browse abandonments". *Journal of Interactive Marketing*, Volume 55, August 2021, Pages 118-145
- [13] V. Andrade Brei (2020), "Machine Learning in Marketing: Overview, Learning Strategies, Applications, and Future Developments", *Foundations and Trends® in Marketing*: Vol. 14: No. 3, pp 173-236. <http://dx.doi.org/10.1561/17000000065>
- [14] A. A. S. Gunawan, Tania, D. Suhartono 2016. "Developing recommender systems for personalized email with big data", *Conference Paper • October 2016* DOI: 10.1109/IWBIS.2016.7872893
- [15] L. Hagen, K. Uetake, N. Yang, B. Bollinger, A. J. B. Chaney, D. Dzyabura, J. Etkin, A. Goldfarb, L. Liu, K. Sudhir, Y. Wang, J. R. Wright, Y. Zhu. "How can machine learning aid behavioral marketing research?". *Marketing Letters* volume 31, pages 361–370 (2020)
- [16] A. Gupta, K. Tomar, "Enhancing Marketing Strategies and Analytics Through Artificial Intelligence", *IEEE, 2021 2nd International Conference on Computation, Automation and Knowledge Management (ICCAKM)*
- [17] J. Choi, K. Lim. "Identifying machine learning techniques for classification of target advertising", *ICT Express*, Volume 6, Issue 3, September 2020, Pages 175-180, <https://doi.org/10.1016/j.ict.2020.04.012>
- [18] G. Masood, A. Bansal, V. Jain, D. Kapila, P. Asha, S. Jaiswal. "Application of Machine Learning to Improve Consumer Devices and Services". *International Journal of Aquatic Science*, ISSN: 2008-8019, Vol 12, Issue 02, 2021
- [19] Y. LAHBABI, S. RAKI, H. C. LAMRANI, S. DEHBI. "Machine learning in digital marketing". (2021). *MENACIS2021*. 28. <https://aisel.aisnet.org/menacis2021/28>
- [20] M. A. MAHMOUD, Y. M. ALOMARI, U. A. BADAWI, A. B. SALAH, M. F. TAYFOUR, F. A. ALGHAMDI, A. M. ASERI. "IMPACTS OF MARKETING AUTOMATION ON BUSINESS PERFORMANCE", *Journal of Theoretical and Applied Information Technology*, 15th June 2020. Vol.98. No 11
- [21] C. M.Q. Ramos, N. Matos, C. M.R. Sousa, M. B. Correia, P. Cascada. "Marketing Intelligence and Automation – An Approach Associated with Tourism in Order to Obtain Economic Benefits for a Region". *International Conference on Universal Access in Human-Computer Interaction*, (2017)
- [22] J. Mero, A. Tarkiainen, J. Tobon. "Effectual and causal reasoning in the adoption of marketing automation". *Industrial Marketing Management*, Volume 86, April 2020, Pages 212-222
- [23] T. Ribeiro, J. L. Reis. "Artificial Intelligence Applied to Digital Marketing". (2020) *Conference paper, Part of the Advances in Intelligent Systems and Computing book series (AISC, volume 1160)* pp 158–169
- [24] A. Miklosik, M. Kuchta, N. Evans, S. Zak. "Towards the adoption of machine learning-based analytical tools in digital marketing". *IEEE Access*, Volume: 7, Pages: 85705-85718 (2019), <https://doi.org/10.1109/ACCESS.2019.2924425>
- [25] A. MAULANA1, T. A. NAPITUPULU. "LOST WON OPPORTUNITY PREDICTION IN SALES PIPELINE B2B CRM USING MACHINE LEARNING". *Journal of Theoretical and Applied Information Technology*, 31st May 2022. Vol.100. No 10
- [26] A. Lawi, A. A. Velayaty, Z. Zainuddin. "On identifying potential direct marketing consumers using adaptive boosted support vector machine": (2017) *IEEE 4th International Conference on Computer Applications and Information Processing Technology (CAIPT)*. <https://doi.org/10.1109/CAIPT.2017.8320691>
- [27] van Rijn, J. *DMA National Client Email Report 2015*. 2015. Available online: www.emailmonday.com/dma-national-client-emailreport-2015/ (accessed on 12 January 2023).
- [28] R. Balakrishnan, R. Parekh. "Learning to predict subject-line opens for large-scale email marketing". In: *2014 IEEE International Conference on Big Data (Big Data)*, pp. 579–584. *IEEE*, October 2014
- [29] Wan Abdul Rahman, Wan Fariza and Che Fauzi, Ainul Azila and Wan Husain, Wan Salfarina and Che Hassan, Siti Hasrinafasya and

- Nik Kamaruzaman, Nik Nahdiya and Wan Aziz, Wan Adibah Hanis. "The usage of artificial intelligence in marketing automation: potentials and pitfalls". Journal of Mathematics and Computing Science (JMCS),(2020) 6 (2). pp. 1-8. ISSN 0128-0767
- [30] Y. Wang, D. Burgener, M. Flores, A. Kuzmanovic and C. Huang . 2011. "Towards street-level client-independent IP geolocation", Proceedings of the 8th USENIX conference on Networked Systems Design and Implementation, (2011), 365–379
- [31] J.M. Müller, B. Pommeranz, J. Weisser, K.I. Voigt. "Digital Social Media and Mobile Marketing in industrial buying: Still in need of customer segmentation? Empirical evidence from Poland and Germany". Ind. Mark. Manag. 2018, 73, 70–83. [CrossRef]
- [32] A. Haleem, M. Javaid, M. A. Qadri, R. P. Singh, R. Suman. "Artificial intelligence (AI) applications for marketing: A literature-based study". International Journal of Intelligent Networks, Volume 3, 2022, Pages 119-132
- [33] Scikit Learn. Scikit-Learn Machine Learning in Python. 2020. Available online: <https://scikit-learn.org/stable/>
- [34] B. Eriksson, P. Barford, B. Maggs and R. Nowak .2012. "Posit: a lightweight approach for IP geolocation". In: Newsletter ACM SIGMETRICS Performance Evaluation Review Archive, 40 (2012), 2–11