

Redesigning Municipality Logos in the Context of Visual Reading Using Artificial Intelligence

Faruk Dursun¹ 

¹Sakarya University, Faculty of Management, Management Information Systems, Sakarya, Türkiye

Corresponding author : Faruk Dursun

E-mail : farukdursun@sakarya.edu.tr

ABSTRACT

The intensive use of technology in the way of business brings about different applications and usage areas. Artificial intelligence, on the other hand, reveals the last point that technology has reached and expands its usage area daily. Every example of artificial intelligence, which we can define as computer software that emerged to realise human abilities such as thinking, evaluation, problem solving by taking people out of the game or minimising their impact in jobs that technically require human elements, is surprising, and the point it will reach cannot be fully predicted. In this study, it is aimed to analyse the logos of institutions/organisations as their windows to the outside world and the first element that welcomes the audience by using visual reading and redrawing them using three artificial intelligence applications (Midjourney, Stable Diffusion and DALL-E 2). For this purpose, the logos of the 11 municipalities in the Marmara region were included in the scope of this study. When the results were evaluated, it was observed that the new visuals were quite successful. The visual meanings of the original logo were largely included in the new logo. Colours were also used in the new logos in a very close fashion to the original. The Midjourney AI application produced more effective drawings than the other two applications. On the other hand, it was observed that the elements of local culture were excluded from the drawings of the three AI tools.

Keywords: Artificial intelligence, visual reading, logo, visual design, artificial intelligence-design

Submitted : 12.03.2024

Revision Requested : 14.05.2024

Last Revision Received : 15.05.2024

Accepted : 27.06.2024

Published Online : 19.07.2024



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1. INTRODUCTION

Artificial intelligence, which is the study of calculations that make perception, movement, and reasoning possible, has become one of the most popular topics in recent times. The use of artificial intelligence applications, which we encounter examples in many sectors, from medicine to industrial design, is becoming inevitable for many sectors. For example, chat robots integrated into websites and mobile applications facilitate the work and actions of users by creating a help menu that lists customer preferences and/or problems. New devices and software facilitate the work of users, aim to reduce the margin of error caused by human error, and provide cost advantages by reducing time and processes. Artificial intelligence, which has begun to be used effectively in the industrial dimension, has reached a dimension that can create visual design outputs. Users obtain drawings and visual representations from artificial intelligence, depending on the texts they provide. Tanughara (2023) used Midjourney, an artificial intelligence drawing module, in the process of developing architectural designs and argued that the drawings generated by artificial intelligence produce concept ideas. Çeken and Şen (2023), in their study on the use of artificial intelligence in the graphic design industry, argued that the integration of artificial intelligence and graphic design is an exciting process that has the potential to transform the creation and consumption patterns of visual media. Al-Qatry and Rady (2023) examined the use of artificial intelligence in the design of women's clothing and applied three artificial intelligence tools, Lexica, Dreamlike, and Midjourney, and found that the Midjourney artificial intelligence tool was superior to the other two tools. Accordingly, in terms of validating the basics and elements of design and achieving the innovative and functional values of new designs, in addition to the impact of the AI tool used on the features of new designs, the Midjourney tool is the best tool in terms of its use in creating various designs for women's wear, followed by the Lexica tool and finally the Dreamlike tool. Borji (2022) studied the reproduction of faces in nature using three AI tools, Stable Diffusion, Midjourney, and DALL-E 2, and found that Stable Diffusion produced better faces than the other tools. Alawadhi and Yousef (2023) examined journey, an artificial intelligence tool, in the creation of plastic furniture in the context of aesthetics, functionality, and production technology and revealed the effectiveness of artificial intelligence in plastic furniture design. Göring et al. (2023a) compared the images produced through Midjourney and DALL-E 2 and found that the images produced through Midjourney were more realistic. Göring et al. (2023b) found that out of 135 images generated using artificial intelligence tools, the images generated using Midjourney and DALL-E 2 tools demonstrated higher performance than real images. Images generated using Glide and Craiyon had lower performance. Tsidylo and Sendra (2023), in their study on the use of artificial intelligence in the education of future designers, found that elements such as environment, lighting, colour, mood, and composition were more effective in Midjourney drawings than Stable Diffusion and DALL E 2 and argued that Midjourney is a suitable tool to use as a methodological innovation. Rozdolska (2022) examined the use of artificial intelligence tools in architecture and found that the drawing created using journey, an artificial intelligence tool, within the framework of a scenario was highly aesthetic and remarkable and therefore had high potential in the context of application. Fahim (2023) examined the use of artificial intelligence tools in packaging and packaging designs suitable for the different cultural textures of the market to be addressed in international product marketing and determined the potential of Midjourney in terms of designs suitable for the cultural characteristics of the target market. Hariffadzillah et al. (2023) examined the use of artificial intelligence tools in the creation of illustrated storybooks for children and found that the visuals produced by Midjourney and DALL-E tools encourage reading and learning. Bao and Xiang (2023) investigated the perspectives of architects and architecture students on the use of AI tools and found that AI can help architects to some extent achieve satisfactory performance. He also argued that the effective application of AI generators will significantly optimise the design process, allowing architects to explore more creative and aesthetic aspects. Çelik (2023) argued that AI tools such as journey, DALL-E 2, Stable Diffusion, Crayon, and Nightcafe, with their high data processing potential, can lead to a paradigm shift in architectural processes. Chen and Kao (2022), in their study of the midjourney-generated visuals of Chinese poet Tang Yin's poem on the painting "Lonely Fisherman on the River in Autumn", found that the generated visuals were not as detailed as the original paintings, but the result of the combination of painting styles and ambient lighting settings produced a visual that was as good as the original in terms of overall mood. Wasielewski (2023) used DALL-E and Midjourney AI tools in his study on hand and counting images and found that the views represented the data in plural form. Chen and Chen (2023) generated landscape expressions in the poem The Hard Road to Shu using the Midjourney AI tool and transferred artworks such as classical Chinese landscape paintings to AI models and found that they were successful in terms of stylistic features, composition, and cultural symbolism. Radhakrishnan (2023) argued that the use of AI tools such as Midjourney in architecture can play a critical role in ensuring that the future of architectural creativity is not interrupted. Hanna (2022) found that when creating artistic and creative advertisements, Midjourney offers different and impressive designs in the context of the words entered. Sánchez and Heras (2023) argued that the versatility of journey, an artificial intelligence

tool for teaching classical antiquity, is an effective and dynamic parameter for students' learning time. Shuhan et al. (2023) conducted a study on the perceptions of designers and design students from Zhejiang and Shanghai Jiao Tong universities on the use of Midjourney in design processes and found a strong positive correlation between the actual use of Midjourney and perceived ease of use, perceived usefulness, attitude and behavioural intention. The results also suggest that Midjourney can be used in design education and has a positive impact on creativity. Hakimshafaei (2023) compared generative AI tools in the fields of architecture and design and found that Midjourney was able to recognise all words in the prompt and use them in the generated images according to DALL-E-2 and Stable Diffusion. Midjourney can also generate new designs that follow the main idea of the prompt. In the DALL-E-2 case, not all words in the prompt could be successfully incorporated into the design. In Stable Diffusion, he found that it did not include all words in the prompt and did not produce high-quality and detailed images. Lu (2023), in his study on drawing emotions using artificial intelligence tools, found that the outputs of Midjourney were more impressive than those of stable diffusion. King (2022), in his study to determine the perception of schizophrenia by journey, an artificial intelligence tool, found that the outputs obtained by using the word "schizophrenia" contain blood and fear expressions with unnatural facial features such as abnormally opened mouths with too many teeth and large red eyes. He argued that this does not match the schizophrenia patients he encountered in the hospital and that artificial intelligence has a structure open to prejudice. Abduljawad and Alsalmani (2022) used DALL-E 2, Stable Diffusion, and Midjourney AI tools to create datasets that are difficult to collect and found that DALL-E 2, Stable Diffusion, and Midjourney demonstrated the best performance, respectively. According to Turgay et al. (2023), Midjourney is used to increase designers' creativity, even though it has the limitation of selecting and intervening in a certain area using an interface. Nistler and Pojeta (2023) found that the outputs of journey, an artificial intelligence tool, for Jezerka stream restoration, Water tower, water animals, and the TGM WRI building contained successful images. Taecharunroj and Kompaniets (2023) used Midjourney to explore place experiences and AI-generated logos for Scandinavian city branding and found that its ability to adapt inputs such as place experiences produced successful outputs in terms of its ability to produce different materials that accurately summarise the unique characteristics of the city.

Graphic design is a perfect combination of aesthetics and communication. However, given the complexity and speed of the digital age, designers have focused on further developing this field by seeking new tools and methods. At this point, artificial intelligence tools have come into play and have expanded the boundaries of design through innovations that they bring to the world of graphic design. The impact of graphic design on user experience cannot be ignored. AI tools can analyse user habits, personalise content and optimise user-friendly interfaces. This helps designers create designs that are not only aesthetically pleasing but also in line with user needs. In the future, the combination of graphic design with AI is likely to further accelerate the transformation of the industry. AI tools continue to offer designers various possibilities to improve creative processes, enrich user experiences, and make the design world more accessible.

In conclusion, the use of AI tools in graphic design can make the design world more effective, efficient, and authentic. This not only offers designers the opportunity to accelerate and improve their work but also opens the door for them to explore new and innovative design approaches. The convergence of AI and graphic design has opened up a new and exciting dimension of creativity, transforming the world of design into the future.

Visual Reading

Visual reading is a type of reading that involves understanding and mentally constructing visuals (Göçer & Tabak, 2012) and includes reading, understanding, and interpreting visuals such as shapes, symbols, pictures, graphics, tables, body language, and natural and social events (Kaya, 2012; Baş & Örs, 2015). In addition, visual reading is the ability to read, understand, and interpret information supported by pictures and graphic images (Güven & Aktaş, 2013). Reading, understanding, and structuring shapes, symbols, pictures, graphics, tables, body language, natural events, and social events in the mind constitute visual reading (Özdemir & Erdem, 2011). At this point, visual reading helps the interlocutors in the formation of mental images, improve understanding of concepts, and solve comprehension problems (Onan, 2012). According to Stokes (2005), visual reading is the ability of the interlocutors to analyse what they see in a message. Büyüktopbaş and Uçar (2021) defined visual reading as the thought that emerges as a result of the connection established with the information in the mind after the message is obtained by visual senses and transferred to the mind. Within the framework of the definitions made and in the light of Sarıkaya's (2017) study, it is possible to define visual reading as a concept that includes the elements of shape, picture, line, rhythm-movement, texture, colour, diagrams and diagrams; it has many benefits in information exchange through its concise and short structures that improve thinking, understanding, learning, and integrating information.

Logo

A logo is a typographic whole containing the name of the institution and organisation to which it belongs (Bayırlı & Kılıç, 2022). Logos are the face of an institution or organisation (Demir & Tür, 2019); While it stands out with its simplicity, memorable, permanent, versatile, and suitable for the target audience, it is more than a business description; it is a flag, a signature (Sevildi, 2014). Logos that are recognised when they are seen, that cannot be defined in words, and that are based on visual perception are striking elements of visual identity, and the stronger the logos, the less they need a typeface (Karsak, 2009). City-specific logos are the first element that matches between the audience and the city in terms of defining the identity of the city and conveying visual impressions (Görgülü, 2019).

Artificial Intelligence

Artificial intelligence, which prioritises the effective use of factors such as precision, performance, and efficient use of time and cost by minimising the human element, is a software designed to create an intelligent behaviour model (Erdem et al., 2023). According to Huang et al. (2021), artificial intelligence has evolved into a unified structure with four sub-fields: computer vision, natural language processing, robotic process automation, and expert systems. In addition, according to Efe and Tunçbilek (2023), artificial intelligence encompasses several interconnected technologies, such as data mining, machine learning, speech analysis, image recognition, sensing, and sentiment analysis. According to Ba et al. (2022), advanced models such as DALL-E 2 and Midjourney can produce realistic text-to-image images.

Models

Stable Diffusion

Launched in 2022, Stable Diffusion uses a deep learning technique called latent diffusion to create images based on text descriptions. Stable Diffusion employs CLIP to project a text prompt into a common text-image embedding space and select a coarse noisy image that is semantically close to the input prompt. The image is then subjected to a denoising method based on the latent diffusion model to produce the final image. In addition to a text prompt, the text-to-image rendering script in Stable Diffusion allows users to input various parameters, such as sampling type, image dimensions, and seed value (Dehouche and Dehouche, 2023).

Midjourney

Midjourney (Alawadhi and Yousef, 2023), a text-to-image AI tool developed by an independent research lab that allows users to create high-quality, well-structured, and detailed images based on textual descriptions and create a wide range of art forms from realistic to abstract styles, applies the principles of low floor, high ceiling, and wide walls. Users have a very low barrier to entry, as they can start getting the results they want with almost no training (low floor), with training the results scale up to commercial and award-winning results (high ceiling), and the results are extended to a wide range of applications (wide walls) (Vartiainen and Tedre, 2023).

DALL-E 2

Based on the unClip method developed by Ramesh et al., DALL-E 2 employs a single image encoder to transform text and images into a diffusion-based joint representation space (prior). Image generation is performed by a similarly trained decoder that translates the encoding of the prior data back into an image (Ploennings and Berger, 2023).

2. METHOD

The question posed in this study is "how deep can AI applications provide insights into logo design and how can these insights support graphic design?". Based on this question, this study addresses the challenges associated with graphic design and present potential AI tools as a means to achieve the following goals:

1. To explore state-of-the-art AI techniques and methods available to support creativity and ideation in the early stages of graphic design.
2. Evaluate the performance and effectiveness of the AI platforms journey, DALL-E 2, and Stabil Diffusion in the context of logo design to create different designs, styles, and future considerations.
3. Assess the challenges of AI text-image generators and provide practical guidelines and recommendations for designers to adopt AI technology and take advantage of its benefits.

2.1. Data

In this study, the municipal logos of 11 provinces in the Marmara region were included in the scope of the evaluation. These cities are Balıkesir, Bilecik, Bursa, Çanakkale, Çanakkale, Edirne, İstanbul, Kırklareli, Kocaeli, Sakarya, Tekirdağ and Yalova. The logos of these cities were analysed by visual reading and redrawn using the Midjourney, DALL-E 2, and Stable Diffusion artificial intelligence tools. Because the artificial intelligence tools are English artificial intelligence tools, the texts analysed by the visual reading method were translated into English, and the drawing was performed based on the English texts.

2.2. Visual Reading Outcomes

Balıkesir Metropolitan Municipality: While an Efe figure is used in the logo to draw attention to the cultural elements of the city, this figure also emphasises the bird paradise feature of the city. Again, the olive branch symbolises the peace and tranquillity of the city, and the agricultural role of the region is also emphasised in the logo.

Bilecik Municipality: The 16 gold-coloured 8-pointed stars in the Bilecik Municipality logo symbolise the 16 Turkish States in the history of the world. The image in the centre of the logo, consisting of two arrows and a bow, represents the Kayı Obası.

Bursa Metropolitan Municipality: The mountains on the logo represent Uludağ, a symbol of the city, while the minarets around it symbolise another symbol, the Ulu Cami. In addition, the dome in the middle of the logo symbolises the Green Tomb, while the sword and shield team and game, a cultural element, are visualised at the bottom. The stars around the logo symbolise the rising value and potential of the city.

Municipality of Çanakkale: The blue colour in the logo of Çanakkale Municipality represents the Marmara Sea, while the castle figure on the logo is separated in the form of a ceramic jug, symbolising the Dardanelles strait. The fish under the logo represent fishing, one of the city's main sources of livelihood.

Edirne Municipality: In the logo of Edirne Municipality, the figure represented by 4 minarets symbolises the Selimiye Mosque and the complex of the mosque, while the green colour used represents the nature of the city.

İstanbul Metropolitan Municipality: For İstanbul, which is defined as Seven Hills, 7 triangle point to each hill. Seven Hills, which is actually a kind of nickname for İstanbul, stems from the fact that the city is built on 7 different hills. The city walls in two separate parts symbolise the two sides of the city, while the blue colour used indicates that the city is a sea city.

Kırklareli Municipality: The logo features a bunch of grapes, as Kırklareli was a city of grapes in line with the word "Lozengrad", the name of the city during the Bulgarian period. Below the bunch of grapes lies the white-tailed eagle, which is endangered in Demirköy and represents wealth and power. Above the bunch of grapes is the Karagöz figure. The leaf on Karagöz represents both the grape leaf and the importance given to the environment.

Kocaeli Metropolitan Municipality: Three symbols representing the city are used in the logo. Among these symbols, the industrial wheel is used dominantly and effectively in the logo and emphasises the city's industrial characteristics. In addition, the Kocaeli clock tower and Atatürk monument are two other elements in the logo. **Sakarya Metropolitan Municipality:** The blue and green colours used in the logo, which consists of the Sakarya Bridge and 3 cogwheel symbols, represent the nature of the city.

Tekirdağ Metropolitan Municipality: In the logo consisting of the first letters of Tekirdağ Metropolitan Municipality, cherry is used because it symbolises Tekirdağ. The cherry is positioned with its leaves in the logo. While Tekirdağ's naturalness and the sea are symbolised with the colour blue, forests and agricultural culture are emphasised with the colour green.

Yalova Municipality: The image symbolised by the carnation on the Yalova Municipality logo expresses the city's active flower growing place, while the image just below it symbolises the richness of underground water and hot springs. While the waves express that Yalova is a sea city, the green and blue colours used symbolise the city's motto, which combines blue and green.

2.3. Limitations

This study was conducted on provincial municipalities in the Marmara region, and the scope be expanded to include regional and district municipalities.

3. DISCUSSION AND CONCLUSION

Official Logo	Midjourney AI Tool	Stable-diffusion AI Tool	DALL-E AI Tool
 <p>BALIKESİR BÜYÜKŞEHİR BELEDİYESİ</p>			 <p>TIRİEE TİICELUQİE EVERAME</p>
 <p>BİLECİK BELEDİYESİ</p>			 <p>Biükiin Btukk</p>
 <p>BURSA BÜYÜKŞEHİR BELEDİYESİ</p>			
 <p>ÇANAKKALE BELEDİYESİ</p>			 <p>MARİVİNG CALIARI BELEDİYESİ</p>





When we look at the logo outputs created using artificial intelligence tools, it can be seen that many elements in the original logo are successfully used by all three artificial intelligence tools in the outputs produced for Balıkesir Metropolitan Municipality. The element symbolising the city's feature of being a bird sanctuary is visualised. In addition, while the olive branch in the original logo symbolises both the agricultural role of the city and its peaceful nature, this element is also emphasised in the generated logos. The Efe figure is not included in the new logo. It can be seen that Midjourney produced a very successful visuals project for Bilecik Municipality. Almost all elements in the input text were included in the outputs produced by the AI tool in question. For Stable Diffusion and DALL-E, it is not easy to say whether they produce successful output. Looking at the output produced for Bursa Metropolitan Municipality, it can be said that Midjourney produced a successful output in line with the text entered. Here too, local elements (the sword and shield team and the game) are not included in the logo. The outputs produced by Stable Diffusion and DALL-E are not as successful as journey. As an exceptional case, DALL-E created a logo using the input "green tomb" even though it was a cultural element. When the new logo produced for Çanakkale Municipality is analysed, it is seen that all inputs are used effectively in all three AI tools. Considering the placement and alignment of the elements, it is possible to conclude that the outputs produced by Midjourney are more successful than the others. In the original logo, the fish figure symbolising fishing, one of the important livelihoods of the city, is used under the logo. This usage is also effectively used in the Midjourney illustrations. Again, the ceramic pitcher figure and the use of sea elements are considered more successful in Midjourney drawings. The logos produced for Edirne Municipality represent the Selimiye Mosque and its complex, symbolising Edirne, and the colour green, representing the city. It is possible to say that the outputs of the three artificial intelligence tools successfully represent these features, whereas the output produced with Stable Diffusion creates the impression of a painting rather than a logo. When we look at the logos produced for Istanbul Metropolitan Municipality, it is seen that the elements in the text analysed by visual reading are more dominant in the logo produced by journey. The visual produced by Stabil Diffusion resembled a cartoon scene more than a logo, while the visual produced by DALL-E resembled a camera angle from a movie frame. In the logo produced for Kırklareli Municipality, elements such as grape clusters, white-tailed eagles, and grape leaves in the text given to the artificial intelligence tools were successfully used in all three tools. However, Karagöz's figure was not included in the three AI tools. It is assumed that this figure is excluded from the generated outputs because it is a local element. The industrial wheel in the logo of Kocaeli Municipality was used dominantly in the logos produced by the three artificial intelligence tools. In addition, the clock tower figure also found a place in the new logo. On the other hand, the Atatürk monument is excluded from the logos produced by the three artificial intelligence agencies. When we look at the outputs produced for Sakarya Metropolitan Municipality, it can be seen that the elements in the input text, which are analysed with visual reading, are effectively placed, and the colours are used as they are in the original logo. While the visuals are used together and in transition with the logic of the logo in Midjourney and the DALL-E artificial intelligence tools, they are symbolised in a disorganised structure in Stable Diffusion. Looking at the logos produced by the three artificial intelligence tools for Tekirdağ Metropolitan Municipality, it can be seen that the output produced by the Midjourney AI tool meets most of the elements in the text analysed by visual reading. While the logo design is more organised with the use of elements together, the elements are scattered in the stable diffusion. When we look at the output produced with DALL-E, it is seen that most of the elements in the input text are excluded. When we look at the visuals created for Yalova Municipality, it is seen that the carnation, which is one of the symbols of the city, and the richness of the underground waters find place in the logos. In addition, the colours blue and green, which also characterise the city, are also included in the logos. On the other hand, while the visual created with the Stable Diffusion application creates an impression that is far from a logo design, it can be said that the visual created with the DALL-E application resembles an oil painting. Midjourney's outputs, on the other hand, are in line with the logo form.

As a result, when we look at the designs created by artificial intelligence applications, it can be said that elements obtained by visual reading and given to artificial intelligence are included in the new logos. In some logos, elements reflecting more intense, general Turkish culture were successfully represented. In particular, general elements such as mosques, minarets, and the Turkish flag can be evaluated in this category. More localised cultural elements, such as Karagöz in the logo of Kırklareli Municipality were excluded from the logos. This is the same as the image representing the sword and shield game in the logo of Bursa Municipality. Here, the sword-shield figure, as a local cultural element, was not included in the new artificial intelligence drawing. In addition, logo designs can be said to carry different cultural influences depending on the textual content obtained from the visual reading method. While the dominant elements of Ottoman culture in the logo of Bilecik Municipality are at the forefront, the logo of Kocaeli Municipality has a more European design. Again, the colours used in the original designs of the logos were used effectively and efficiently in the logo redrawn by AI. It is noteworthy that artificial intelligence fails to add text to logos. This can be attributed to the fact that the artificial intelligence application works with the visualisation model.

Artificial intelligence offers several advantages and innovations in terms of graphic design. In this context;

Increased Speed and Efficiency: AI can increase speed and efficiency by automating graphic design processes. For example, algorithms that can handle large datasets perform repetitive tasks in the design process more quickly and effectively.

Personalisation and Segmentation: AI can create personalised graphic designs based on user behaviours and preferences. User segmentation and analysis can be used to customise designs for specific target audiences.

Style Transfer and Creativity: AI can transfer styles between different artistic styles and create creative designs. This gives designers the opportunity to bring different aesthetics together and create unique designs.

Colour Selection and Harmony: AI algorithms can help with colour choices based on colour theory and psychology. With colour harmony analysis, the visual impact of designs can be increased.

Visual Recognition and Content Analysis: AI can recognise objects and content in images via visual recognition and content analysis. This can help designers create meaningful graphics that align with the content.

User Experience and Interaction: By analysing user behaviours, AI can provide information to design better user experiences for websites and applications. Recommender systems can suggest personalised content and designs to users.

Education and Skills Development: Graphic designers should be trained to understand and utilise AI technologies. Aptitude towards AI-based design tools can increase designers' competitive advantage.

Human-Machine Collaboration: Artificial intelligence can help designers, but human creativity and aesthetic sense are important. Human-machine collaboration makes the most of the power of AI.

Ethics and Transparency: Ethics and transparency principles should be considered when using artificial intelligence. Transparency should be ensured in terms of the criteria on which designs are created and how personal data is used. The use of AI in graphic design can provide designers with the opportunity to spend more time and energy focusing on creative areas. However, technology must be used correctly and ethically.

Peer Review: Externally peer-reviewed.

Conflict of Interest: The author has no conflict of interest to declare.

Grant Support: The author declared that this study has received no financial support.

ORCID ID of the author

Faruk Dursun 0000-0003-1571-1107

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How cite this article

Dursun, F. (2024). Redesigning municipality logos in the context of visual reading using artificial intelligence. *Acta Infologica*, 8(2), 88-99. <https://doi.org/10.26650/acin.1451569>