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Trubnikov S.V., Denysiuk O.R.

IMPLEMENTATION OF A HELPER PROGRAM FOR COMICS CREATION USING TEXT PROCESSING METHODS

Ukrainian State University of Chemical Technology, Dnipro, Ukraine

The paper discusses the development of a helper program «TypesetHelper», designed to facilitate the process of creating and translating comics. An analysis of functions of translation in modern society shows that translation, currently, is primarily a means of enabling communication between people who speak different languages. This applies, among other things, to such a specific niche as the translation of graphic novels, comics and manga. In the modern world, comics have become an integral part of popular culture, but in Ukraine, the culture of reading and translating comics is only at the stage of active formation. The purpose of this work is to create software that would facilitate the process of work with the inclusion of translated text in corresponding cleared illustrations. It is demonstrated that the existing software, including both general-purpose graphic editors like Adobe Photoshop and specialized programs for automatic recognition and translation of comics and manga, has disadvantages with respect to the problem being solved and can not be considered as a complete analogue of the software being developed. The functions that the program should perform include opening an image file, placing a text in a selected area, centering a text relative to a cloud, creating text layout, creating correct word division using automatic hyphenation methods, saving the image to a file. An analysis of possible methods of text layout when filling text clouds of various forms is given. The paper consider software design using the Unified Modeling Language (Use Case diagram, State Diagram, User Activity diagram) and its development using the C# programming language. Illustrations of the program operation process are given, which demonstrate its interface and examples of text division and layout using the selected methods. The developed helper program has practical value and can be used in comics and manga publishing houses, or for amateur translation.

Keywords: text processing, comics, text layout, UML, C#.

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Problem statement

The 21st century sets new challenges in the information space of mankind. Because of mass media, the role of translation in the life of mankind is steadily increasing [1]. Today, translation relations cover almost all spheres of human activity. The movement of information flows knows no boundaries, no time, no space. The infinite diversity of the modern world is transmitted through the media in the views and interpretations of numerous participants in the international information process, like journalists, correspondents, commentators, cameramen. Therefore, the importance of translation activities is constantly growing, and at the same time, new translation problems also appear. The aggravation

of language problems dictates the search for new solutions [2]. If earlier translation activity was considered only in connection with the translation of fiction, today translations of texts of a special nature, like informational, economic, legal or technical, began to occupy more and more important place in terms of volume and social significance. At the moment, specialists in highly specialized subjects, such as technical, medical, economic, and many others, are widely popular in translation activities.

To date, the requirements not only for translation and its quality, but also for the translators themselves have increased as much. In the modern world, there is a very large number of translation types: oral interpretation, written translation, machine

translation, as well as a huge number of divisions for each of these types of translation. A modern translator must have a number of qualities, such as responsibility, an objective assessment of their knowledge and capabilities, and a sense of language. No less important is the ability of a translator to choose the right vocabulary and to recode the text in the right way. For this purpose, in most cases, special translation programs such as Trados or thematic dictionaries become helpful.

Currently, the main function of translation is informative or communicative, so translation is a means to ensure the possibility of communication between people who speak different languages. This applies, among other things, to such a specific niche as the translation of graphic novels, comics and manga. In the modern world, comics have become an integral part of popular culture and have gained popularity in a variety of age and social groups, at the same time, in Ukraine, the culture of reading comics is at the stage of active formation. Globalization and the establishment of a close dialogue between cultures have determined the growing interest to the problem of translating comics into Ukrainian.

Analysis of recent research and publications

At the moment, there is quite a lot of software that allows its users to process and create translations of manga, comics, the main ones in use are Adobe Photoshop and Paint.

Adobe Photoshop is mainly designed for editing digital photos and creating bitmap graphics. Special features of Adobe Photoshop include great variety of tools for creating and processing bitmap images, high quality processing of graphic images. However, the disadvantages of the approach based on the use of general-purpose image editors, such as Photoshop, include the fact that all the necessary actions for typesetting (filling in the text on the image) are carried out manually. A typesetter must, first of all, select a zone, then insert a text, lay it out manually, then select another tool and move the text so that it is centered. All operations are performed at the discretion of the user, often with errors. Automation of some processes, such as word division, text layout, text centring, will improve both the speed of translation and its quality, given that a user still has the ability to make additional adjustments, if necessary, in manual mode. Creation of software with such features will greatly facilitate the process of translating manga and other types of comics for a user.

The Mantra software, developed by students and staff of the University of Tokyo, specializes in

translating from Japanese (the original) into five other languages, including Korean, French, English, and so on. The advantage of this program is that it detects areas with text automatically using convolutional neural networks, clears these areas, and inserts the translated text in the desired location (cloud) [2–3]. However, there are also significant disadvantages, namely: the program can not recognize a text if it has a background, only single font is used, often a size of resulted text is larger than a cloud itself, so a word does not fit into necessary boundaries, the word division is not carried out, so the layout itself does not exist, in some cases, two languages are superimposed in one cloud. In addition, despite the significant development of machine translation tools over the past decades, the quality of fully automated translation is still significantly inferior to the quality of human translation [4].

Formulation of the objectives of the paper

The objective of this work is to create the software «TypesetHelper». As the name suggests, it should help fill in the text in the clouds during the translation of manga and comics. Creating a proper layout (placing text relative to the cloud) is the main task of development.

The functions that need to be implemented include:

- opening an image file;
- placing text into a selected area;
- centering text relative to a cloud;
- creating the layout of a text;
- creating correct word hyphenation;
- saving the image to a file.

The correct word division mechanism should present variants of splitting the word with all possible hyphenations, after which the necessary word length will be selected, and the rest will be transferred to the next line [5].

Outline of the main research material

When developing the software, four methods of text layout were proposed and compared.

The first proposed method consisted of determining the length of a string based on the full width of user-selected area. Its main drawback was incorrect division of words, transferred part of the word became too short, or too long. The second method was based on calculation of the length of each line as a specified percentage of the entire length of the text in pixels. As in the previous case, because of the uniqueness of the division of each word, it is impossible to find a string length that coincides with the ways of dividing the word, proposed by the word division algorithm. The third method involved counting a number of transfers and distributing them

in rows according to the layout principles. The advantage of this method over others is the fact that it is possible to select a transferred part of the word more accurately, disadvantage is the fact that spaces between words destroy the layout, as they are not considered when defining the text size. The fourth and last of the proposed layout methods involved filling each line with a certain number of syllables, the advantage is the ability to accurately calculate the required number of syllables for a particular line, the disadvantage is that the length of the line may be greater than the width of the selected area. This disadvantage can be eliminated by automatically reducing the font size. The layout in this case has a better look compared to the other methods proposed above. During the development, based on the analysis of all the proposed methods, the fourth method of layout was chosen.

When designing the software, UML diagrams shown in figures 1–3 were created. Figure 1 shows a Use Case diagram that includes main actions of a user.

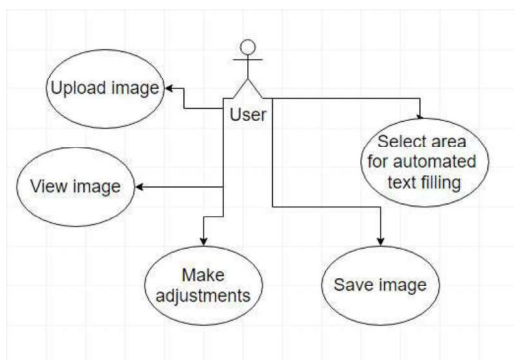


Fig. 1. Use Case diagram

The user first needs to upload an image, to check how the image looks in full size, user’s optional actions include: making adjustments to the program settings, updating already created scripts, replacing, deleting them, or adding new ones. In the process of applying text to an image, the user can select the desired area, enter a text that they want to fill this area with, and get an automated result according to the selected settings. On a last step, the user must save their actions, namely save the updated image in one of the types: png, jpg, bmp.

The State diagram is shown in fig. 2. It includes four main states: program startup, initialization, running the program, and saving all data. First, the user starts the program, then initialization occurs so that the system can use scripts and fonts. During operation, the user can access the functions of the program, described above, after completion of working process, all activity is saved to a specific file.

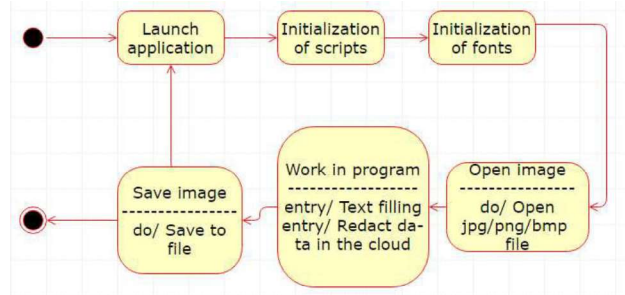


Fig. 2. General State diagram

Figure 3 shows the Activity diagram. The program has only one actor, which is the user, so everyone has the opportunity to use it.

The user selects a necessary action using the main form, optionally selects other functionality, if the work is completed, exits the program.

Figure 4 shows the result of program operation. In the program header, the user can change the font, its size and style, frame color, interface language. In the right panel, the user can edit scripts, select the necessary action, like centering, and a certain type of layout. This panel also contains a text field that allows the user to get the available options for division of an entered word. The text color is selected below. The next component is a field for entering and editing

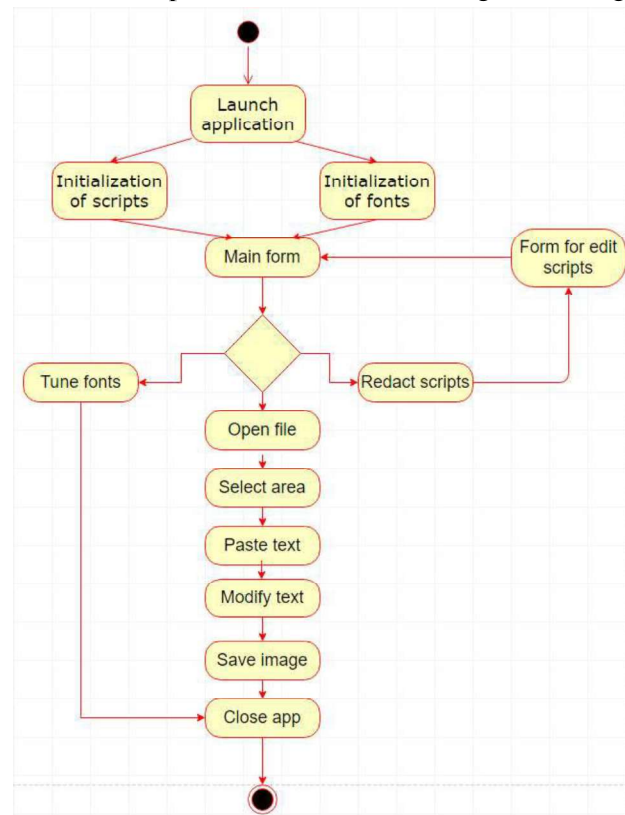


Fig. 3. Activity diagram for the user

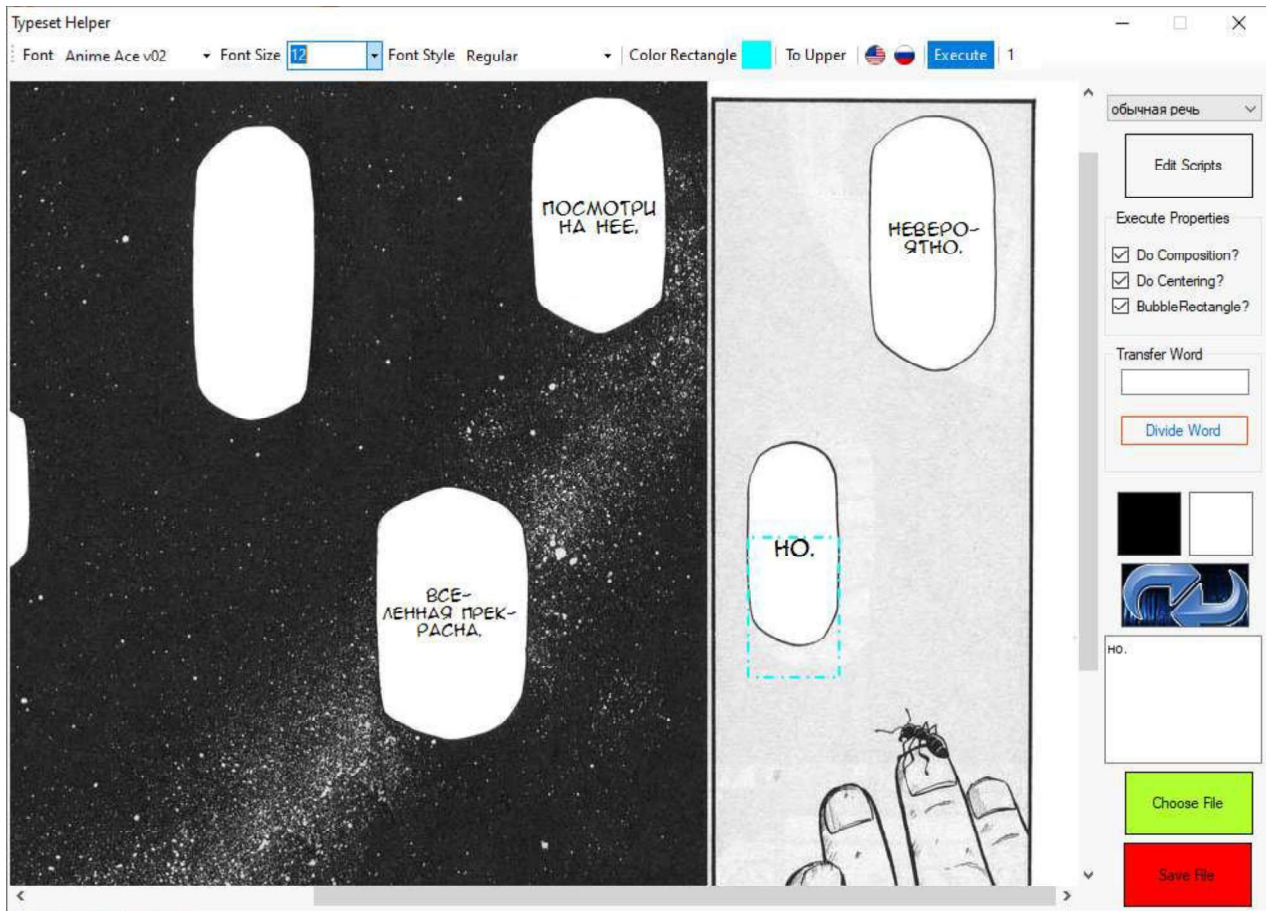


Fig. 4. General view of text-filled clouds in the English interface

text. The last program control elements are buttons for opening and saving images.

All the user needs to do is upload an image, select a fill zone, insert a text in a special field and click the «Execute» button. The program does not guarantee the best version of the layout, it only offers one of the options to which adjustments can be made at a request of the user.

Conclusions

As noted in the paper, there is a growing attention to the translation of multimedia texts nowadays. The number of translations of comics into other languages grows as well. At the same time, amateur translation in this field has a much larger scale than professional translation, which affects the quality of translations. The developed software allows its users to automate some stages of the translation process, which makes it possible to make the translation process faster and better. The analysis of various methods of text layout when filling text clouds is carried out, and the best of them is selected. The work is of practical significance and can be used in comics and manga publishing houses.

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РЕАЛІЗАЦІЯ ПРОГРАМИ-ПОМІЧНИКА ДЛЯ СТВОРЕННЯ КОМІКСІВ З ВИКОРИСТАННЯМ МЕТОДІВ ОБРОБКИ ТЕКСТУ

Трубников С.В., Денисюк О.Р.

У статті розглядається розробка програми-помічника *TypesetHelper*, призначеної для полегшення процесу створення та перекладу коміксів. Аналіз функцій перекладу в сучасному суспільстві демонструє, що переклад являє собою перш за все засіб забезпечити можливість комунікації між людьми, що говорять на різних мовах. Це стосується, поміж іншого, такої специфічної ніші, як переклад графічних романів, коміксів і манги. У сучасному світі комікс став невід'ємною частиною масової культури, проте в Україні культура читання та перекладу коміксів знаходиться тільки на стадії активного формування. Метою даної роботи є створення програмного забезпечення, що повинне полегшувати роботу з включенням перекладеного тексту до відповідних очищених ілюстрацій. Демонструється, що існуюче програмне забезпечення, включаючи як графічні редактори загального призначення, так і спеціалізовані програми для автоматичного розпізнавання та перекладу коміксів та манги, мають недоліки стосовно вирішуваної задачі і не можуть розглядатися як повний аналог програмного забезпечення, що розробляється. Функції, які повинна виконувати програма: відкриття файлу зображення, розміщення тексту у вибрану зону, центрування тексту щодо хмари, компонування тексту, коректне перенесення слова з використанням методів автоматичної розстановки переносів, збереження зображення до файлу. Наведено аналіз можливих методів компонування тексту при заповненні текстових хмар різної форми. Розглядається проектування програмного забезпечення за допомогою мови *Unified Modeling Language* (діаграма прецедентів, діаграма станів, діаграма діяльності користувача) та його розробка з використанням мови програмування *C#*. Наведено ілюстрації роботи програми, які демонструють її інтерфейс та приклади перенесення та компонування тексту за допомогою обраних методів. Дана програма-помічник має практичне значення та може бути використана у видавництвах коміксів і манги, або для аматорського перекладу.

Keywords: text processing, comics, text layout, UML, C#.

РЕАЛИЗАЦИЯ ПРОГРАММЫ-ПОМОЩНИКА ДЛЯ СОЗДАНИЯ КОМИКСОВ С ИСПОЛЬЗОВАНИЕМ МЕТОДОВ ОБРАБОТКИ ТЕКСТА

Трубников С.В., Денисюк О.Р.

В статье рассматривается разработка программы-помощника *TypesetHelper*, предназначенной для облегчения процесса создания и перевода комиксов. Анализ функций перевода в современном обществе показывает, что перевод представляет собой прежде всего средство обеспечения возможности коммуникации между людьми, говорящими на разных языках. Это касается, среди прочего, такой специфической ниши, как перевод графических романов, комиксов и манги. В современном мире комикс стал неотъемлемой частью массовой культуры, однако в Украине культура чтения и перевода комиксов находится только на стадии активного формирования. Целью данной работы является создание программного обеспечения, которое должно облегчать работу с включением переведенного текста в соответствующие очищенные иллюстрации. Демонстрируется, что существующее программное обеспечение, включая как графические редакторы общего назначения, так и специализированные программы для автоматического распознавания и перевода комиксов и манги, имеют недостатки относительно решаемой задачи и не могут рассматриваться как полный аналог разрабатываемого программного обеспечения. Функции, которые должна выполнять программа включают: открытие файла изображения, размещение текста в выбранную зону, центрирование текста относительно облака, компоновка текста, корректный перенос слова с использованием методов автоматической расстановки переносов, сохранение изображения в файл. Приведен анализ возможных методов компоновки текста при заполнении текстовых облаков различной формы. Рассматривается проектирование программного обеспечения с помощью языка *Unified Modeling Language* (диаграмма прецедентов, диаграмма состояний, диаграмма деятельности пользователя) и его разработка с использованием языка программирования *C#*. Приведены иллюстрации работы программы, демонстрирующие ее интерфейс и примеры переноса и компоновки текста с помощью выбранных методов. Данная программа-помощник имеет практическое значение и может быть использована в издательствах комиксов и манги, а также для любительского перевода.

Keywords: text processing, comics, text layout, UML, C#.

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