

The Intelligence APP development for children's Kanji character education using Block and Stop motion

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Abstract

With the growing shift from traditional educational approaches and studying to the more digital classroom, using electronic textbooks and digital native's demand, there is a growing need to develop new methods for learn Kanji characters for children. The purpose of this study is to help children learn the basic Kanji by using stop motion and block methods, and approaching the basic Kanji character education with a more innovative and interactive smart phone APP.

In the development of this smart phone App for children's Kanji character education proposed in this study, 100 basic Kanji characters for children are selected. These 100 characters are required for the stop motion animation production, where each selected Kanji is created as a stop-motion animation utilizing a variety of techniques, such as storytelling, to better engage children. The intelligent App is designed with image recognition technology, so that in the learning process children take a picture for the assembled block using their smart phone, the APP then recognizes whether it is assembled correctly, and then plays an animation corresponding to the assembled Kanji character.

Key words: *Stop motion, Block Puzzle, Intelligence App, Kanji character image, Image recognition technology*

1. Introduction

In our modern society, we can't force our students, who are familiar with internet, TV and various multimedias, to be interested in the classroom activity using only textbooks and blackboards. Current students are familiar with the cultural products which are represented as electronic messages and images. They are the generation who have grown up in an economically wealthy background unlike the previous generations. In the current era with the fast development of information and communications technology, students' are increasingly exposed to audiovisual centered multimedia driven by the development of the Internet and the public dissemination of various IT media. In this situation, the media genre called educational webtoon can be an issue in consideration that Korea has a high percentage rate of internet usage, and comics readership, compared to other reading materials, and it is easy to read and is interesting with its pictures.

Due to the high level of internet usage by Korean children, it has a lot of advantages in terms of stimulating

their motivation. In these circumstances, in terms of educational aspects such as the increasing use of electronic textbooks and digital native learners, there is an urgent need to introduce an educational contents substituting learning methods via character information and information design methods for this new trend. In the traditional Kanji character's school education, memorization (semantic memory), with writing and reading is the dominant educational approach, but this kind of educational method with no storyline gave learners a preconception that learning Kanji characters is very difficult and also easy to forget.



Figure 1. Currently used Kanji character education (example)

However, in the teaching of English language, cross-media development of printing materials and audiovisual materials are actively introduced, and the way of expanding the episode memory is now widely used as a learning method with a story. This study used an educational kit beyond the way of cross-media expansion. In this study, Block Puzzle is used as a way that children can approach with a playing culture along with image recognition-based educational kit developed to explain the principles of Kanji characters.

Smart phone intelligence APP development is tried in which children can enjoy with games, while using animation method and stop motion along with a block puzzle, which has an advantage of easily accessible environmental conditions. This study is trying to help children learn Kanji character easily using stop-motion and block puzzle. Children cannot become bored learning Kanji character if they learn with a smart phone and recognize the study as a play.

2. Related Studies

2.1 Block Puzzle

The children can develop themselves by study and grow through a play. Children who have these attributes have the features that can promote a higher educational experience when they play with a specific thing and direct experience. Children freely express their inner world through the medium of play and this free expression activity is very helpful in the development of children's self-concept and spatial abilities. J. Bender mentioned that Block is designed specifically to meet the needs for children to learn through play with toys, and Block is one of the toys that can develop the creative abilities of children. This is because Block doesn't provide children with the completed world, but it can give children the world which they can themselves create[1].

Block doesn't provide children with the completed world but it can give children the opportunities that can develop their self conception and spatial abilities by the process of thinking and sharing and creating the story[2].

2.2 Stop motion

Stop-motion is a camera cinematography technique involving the moving a stationary object a little bit in every frame, to create an impression of continuous movement. In this technique stop motion causes the moving screen to be stopped as much as it is needed[3]. Stop-motion has led to many achievements in the area of special effects, as well as animated films. Synthetic mat is a technique for synthesizing live-action with the movement of the character, which is represented by the stop motion [4].

The stop-motion camera is rolled 24 frames per second but a number of companies produce the animation at 12 frames then by exposing it from one frame to every two frames, to make 24 frames per second. This is intended to reduce production time and budget.

2.3 Foreign Technology Status

The HIT Lab in New Zealand has introduced a "Magic Book" for students active and intuitive education. Magic book is a storytelling method using augmented reality. It can increase student's commitment to the educational process through a visual and immersive transfer of material. Sweden Morten Fjeld, etc used the Reality Tangible teaching method based on Augmented Reality using markers unlike conventional chemistry teaching methods and offered a more intuitive and visual chemical education. This is a training method that observes a coupling structure of a molecule, it is presenting by using the three-dimensional model instead of the previous plastic assembly model (BSM, Ball-and-Stick Model)

3. Children's Kanji character Development Education Intelligent APP

In the conventional products, if the words are assembled well, a built-in voice comes out of the device. The current products are not suitable for children who do not know the character and who are lacking in the motivation to stimulate a curiosity by the usage of common block. Furthermore, it is expensive because a user needs a device which can recognize an additional content, and a power device is required for each block.

The proposed educational contents for Kanji character are trying to develop an intelligent smart phone App that can help with image formation and brain development of children through direct experiences via visual, auditory and tactile sense. Furthermore, this study suggests a technology that fuses together IT technologies and content for a basic Kanji character education. The intelligence block below is the technology that fuses IT technology and educational contents to the current building block.

- ① Listen to the sound or look at the Kanji character on a mobile phone or tablet screen
- ② Combine each compartment of the Kanji character block after looking at the picture.
- ③ Once the shape of the Kanji is completed, animation or suitable sound comes out from the mobile or tablet, which is applicable to the O-X.

The main features include

- ① Shows the Kanji character by a smart phone in advance.
- ② Combine each compartment of Kanji character block.
- ③ Then recognize the blocks combined by smart phones.
- ④ If it is the right shape, the applicable animation is shown with a loud music.

The advantages of the technology proposed above are with the stimulation of curiosity through stop-motion animation's screenings. It is boosting the memory by remembering characters via the pictures. Furthermore, existing products need a separate device, but the above products are using a smart phone APP in which the separate device is unnecessary. Children can learn more easily because it is using an image recognition technology.

3.1 Development of Block Puzzle

This study developed a block which can combine more than 200 Kanji using only 26 blocks, with 3D printing technology. Figure 2 shows the developed block image and assembled Kanji characters.

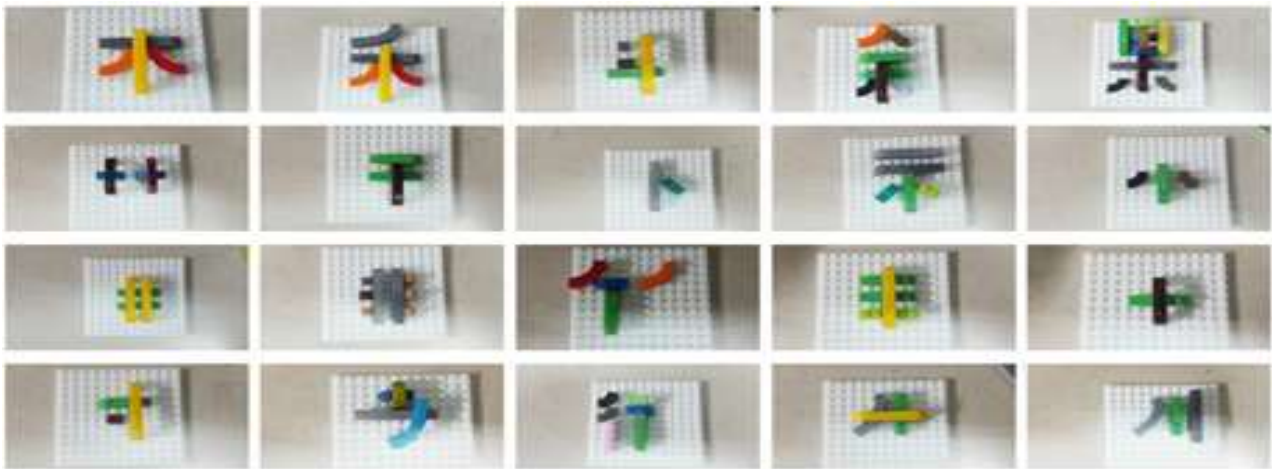


Figure 2. Developed block image

3.2 Stop motion set configuration and manufacturing techniques.

This study shows the shooting set of stop motion animation which can describe the Kanji character. Figure 3 shows the stop-motion set-up with a variety of production methods for recording images. This study used Clay Animation and cut-out animation techniques which children like most in the stop motion techniques and shoot a film by changing a set in order to get rid of Kanji character's boredom.



Figure 3. Stopmotion shooting set and diverse manufacturing techniques

4. Results

4.1 Stop-motion animation

For the study development, this study selected a suitable Kanji character which is appropriate for the children's education. Using a selected Kanji character, it produced a children's stop-motion animation and completed 100 hieroglyphs with interesting animations(甲車犬曲果瓜九女大刀斗豆力六立馬ㄣ皿母木目文門米民白父北匕山三生西夕石小水矢心十羊魚五玉又牛雨云月二人一日日子子田田中中亼川川寸七七土土土八八貝貝勺兄兄火火禾禾). The figure 4 is the sample image of stop motion animation.



Figure 4. Shooting set for completed stop motion animation

4.2 App development using image recognition technology

The App procedures using image recognition technology can be summarized as the following three factors. Recognize the block Kanji character through smart phone camera. Secondly, process whether the combined Kanji characters are right or wrong. Thirdly, develop intelligent App which can play the stopmotion animation which is of the appropriate block Kanji character.

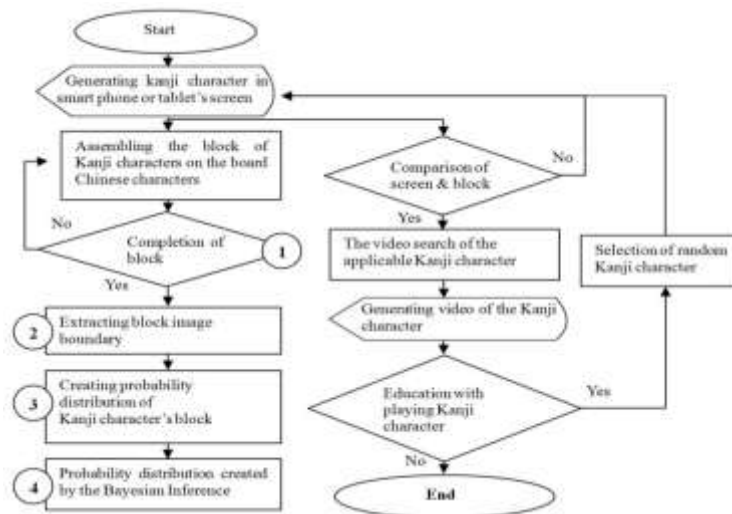


Figure 5. The flow chart of image recognition App

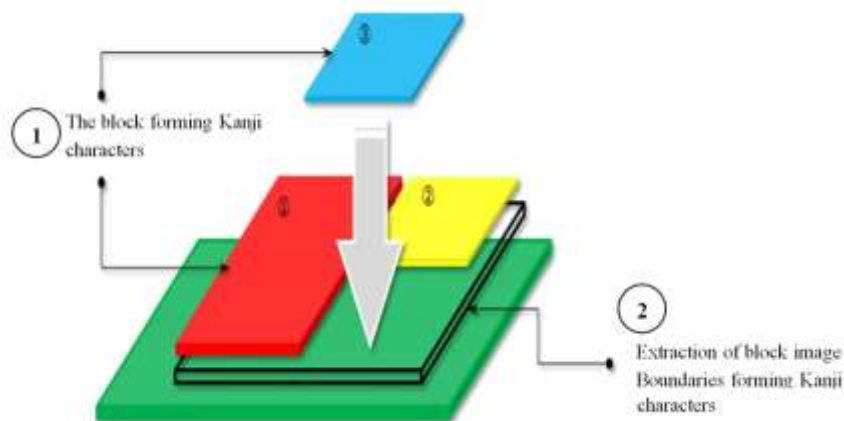


Figure 6. Kanji block combination and how to extract image boundary

Processes ① and ② are described in Figure 6. A Kanji character is created by a combination of Kanji character block. Figures 3 shows the example created by 3 blocks. 3 Kanji character blocks can create one Kanji character then the block image boundary is extracted like ② in figure 6 in order to raise the character recognition efficiency by smart phone and tablet.

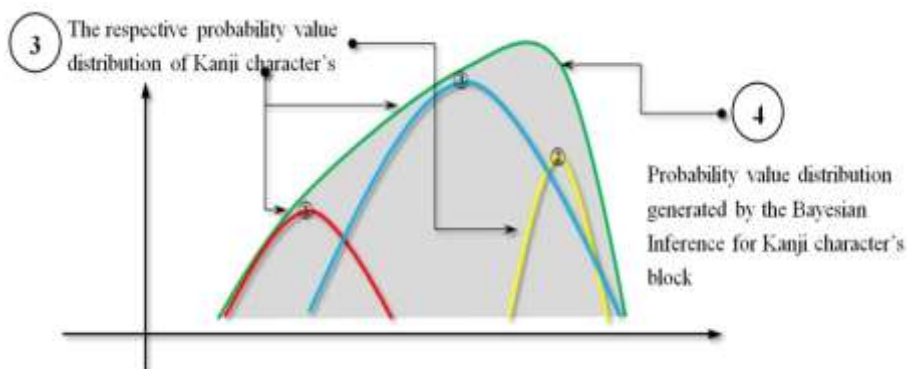


Figure 7. Probability reasoning process according to Bayesian inference procedure and the probability Distribution of Kanji block

Figure 7 shows that procedures ③ and ④ in Figure 5, ③ are illustrating a probability distribution corresponding to the selected Kanji character block, ④ shows the result of the probability distribution according to the Bayesian inference by the respective probability distribution. The combined Kanji character's correctness can be judged by the distribution of the inferred probability. The figure 8 shows the finally completed APP.



Figure 8. Completed App example.

5. Conclusion

Using a smart phone APP which is built upon the related infrastructures of hardware, software, and wireless communication functions necessary for image recognition, this study describes developments to enhance the realism and participant immersion by the use of this image recognition technology in the field of education, training and game sector. This study suggested the development of Kanji character's educational contents for children using a smart phone app and prototype production using cross media for the Kanji character's educational contents. It is recognized by this study that there is a need to offer the other diverse approaches for educational contents, and it is a more developed study in terms of offering the possibilities of educational contents for children using smart phone App. However, this study seems to have some deficiencies in many ways due to time and environmental factors.

The biggest limitation of this study is that even though it is researching children's educational contents using a smart phone intelligence App, it doesn't present sufficient supporting academic and leading technological research, and exhibits lack of academic and technological approach. However, because the smart phone App's are rapidly developing at home and abroad, and fusion businesses are researched continuously, the next should encompass successful educational contents based on leading academic and technological studies.

References

- [1] J. Bender, "Large hollow blocks: Relationship of quantity to block building behaviors," *Young Children*, Vol. 33, No. 6, pp. 17-23. 1978.
- [2] H.H. Seo, "A Qualitative Research on Teacher's Strategy for Sociable Behavior of Children resolving Conflict in Block Play," Vol. 17, No. 1, pp. 99-122, 2013.
- [3] <https://ko.wikipedia.org/wiki>
- [4] C.Y. Choi, "Study of Efficient DOF(Depth of Field) for a Animation with Using Miniature Background," *The Korean Journal of animation* Vol. 9, No. 3, pp. 74-92, September 2013.