

Technical Article

Possibility of regional revitalization by students' IT

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Abstract

Recently, the number of students who can develop applications that can actually be used has increased. We thought that this power could be used for regional revitalization, we tried to connect the students and the region. As a result, we were able to create some interesting applications, some of which have become widely used in practice. For students, before going out to society, they can work on practical application development and know what kind of ingenuity is necessary to get them to actually use it. Although quality is not necessarily guaranteed in rural areas, the possibility of using the latest AI technology at a short development time and at a low cost was shown.

Keywords: IT; AI; Regional revitalization; Education free from pressure.

1. Introduction

Japan's population has continued to decline after peaking at 128.08 million in 2008. Depopulation is progressing remarkably, especially in rural areas (Ministry of Land, Infrastructure, Transport and Tourism, 2012). For example, as of October 1, 2021, the total population has decreased by 0.51% compared to the previous year, and the population has decreased by 644,000 people in one year. Considering that the population of Tottori Prefecture is 570,000 (2016), the population of the prefecture unit is lost every year. For this reason, especially in rural areas, the declining birthrate and aging population are causing various problems.

Kyushu Institute of Technology is a so-called local national university, and the one of the social role of the university is to contribute to the local community (Ministry of Education, Culture, Sports, Science and Technology, 2012). Therefore, the role of universities in regional revitalization is not small. However, in terms of implementation, university research is not always suitable for local areas. Many of them are not suitable for local areas because most of them are aimed at cutting-edge research targeting large companies and the world. For example, it is hard to believe that research on superconductors can be transferred to rural areas, now. Also, at Kyushu Institute of Technology, many of the graduates are employed in the Kanto region, centering on Tokyo, rather than in their hometown of Kitakyushu, and the percentage of those who remain in local companies is smaller. For this reason, local national universities are doing research and human resource development for the sake of urban areas.

On the other hand, since around 2015, we have the impression that students' ability to create real applications has improved dramatically. Until now, it has been customary for students to be able to develop applications that can be used as jobs through study, practical training, and practice at companies within a few years after graduation. In other words, although students learned the basics of programming, that is, "data structures and algorithms" and so on, they could hardly create applications that can actually be used, such as smartphone applications, web applications, and bots just after their graduation. But today's students already have high skills and extensive knowledge to create practical applications. One of the reasons is that the latest IT (Internet technology) can be learned through the Internet at a low cost compared to other technologies that require large-scale facilities and budgets. They teach themselves their

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favorite programming that can make use of their individuality, and study more carefully with their friends at university. It is becoming possible to create practical applications. IT is low-budget, and you can get a lot of high-quality information from the Internet, and you can actually use it and improve your skills. In this way, compared to other engineering fields, IT has a wider range of areas that can be tested by oneself.

Here, one of the problems of students with skills is what kind of application should be created. In other words, it is difficult to find out what kind of issue should be solved. In various programming contests, it is required to find an interesting problem and solve it. On the other hand, there are many problems in rural areas. Students' applications may be able to solve these problems.

In this report, as a form of contribution to local communities by universities, we give students local issues and try to solve local issues through applications, exploring the possibility of helping local revitalization.

2. Methods and results

2.1 Issue extraction

Saikai Creative Company is a regional trading company located in Saikai City, Nagasaki Prefecture, and is working on various regional revitalization initiatives in cooperation with Saikai City Hall. In May 2019, Saikai Creative Company conducted a questionnaire survey of Saikai citizens (Table 1). Saikai City is located at the western end of Nagasaki Prefecture, and is a city located in the northern part of the Nishisonogi Peninsula in Nagasaki Prefecture. In 2005, five towns merged to form Saikai City. There are few plains and many mountains. Coastal fishing and agriculture are thriving. There is also Matsushima Thermal Power Station by Electric Power Development and Oshima Shipbuilding.

Table 1. A part of the questionnaire we asked citizens of Saikai city, Nagasaki.

33age/F/Editor/Assistant Designer/mother of 2

It will tell you the weather forecast.

You can reconfirm the broadcast within the city.

It will tell you the time and operation status of the Segawa Maru (ship).

It will tell you about the bargains at the supermarket.

You can use it as a kitchen timer.

We will make a reservation for a reservation-type shared wagon.

It manages schedules for the whole family.

It teaches the best of children, grandpa and grandma.

It tells you about events for children in Saikai city.

It will tell you the news.

It provides condolence information.

The population of Saikai city in 2017 is 28,000. The estimated population for 2022 is 25,000, and the population is steadily declining. It is a typical region where the declining birthrate and aging population are progressing due to population decline. This questionnaire was taken by various age groups, and simply asked how local problems could be solved, or what kind of things they wanted to be solved.

We chose the following three problems from the questionnaire and tried to think of a solution.

1. The loudspeakers of the local public announcements are soft and unstable, making it difficult to hear. Especially when the weather is bad like a storm, the windows cannot be opened, and very important evacuation information and information about the suspension of Oshima Ohashi Bridge cannot be obtained. We can't listen to it again. Isn't there a way to stably listen to the local broadcast?
2. At the city hall, so-called "transcription" work occurs every day. Documents that are printed but not digitized are manually entered by staff in order to convert them into electronic text (transcription). There should be OCR software, but it is not used. Can't you just transcribe it easily?
3. Farmers produce high-quality agricultural products and pickles using those agricultural products, but they are not able to deliver them to consumers. They want to concentrate on the original farming, but it takes a lot of manpower and time to sell. On the other hand, although there are many e-commerce sites that use websites, it is not possible to use it, especially among the elderly who cannot handle smartphones well. Is there an easy way to do e-commerce?

2.2 Town Broadcast (Disaster Prevention Administrative Radio)

Saikai City also has a local broadcast (disaster prevention administrative radio) and example of text is listed in Table2. However Saikai City has many mountainous areas and is unstable, making it difficult to hear. We considered using Amazon Echo for this (Fig. 1).

Table 2. Example of text of Town Broadcast.

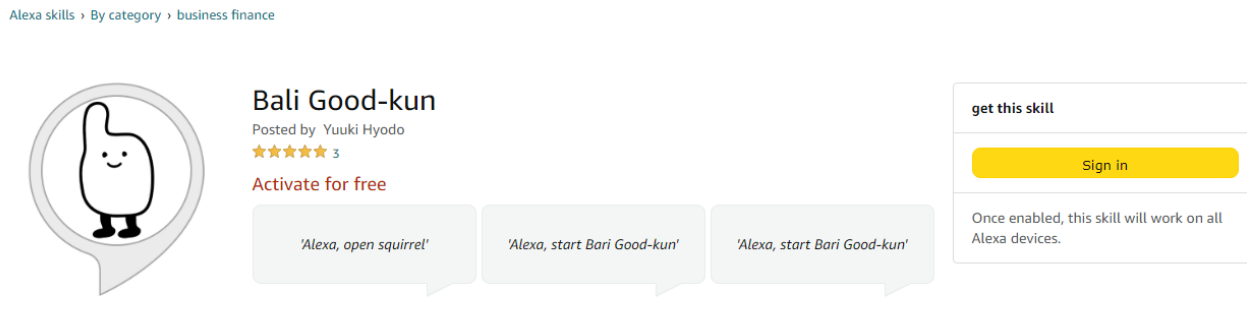
Original Japanese text	English translation
<p>こちらは西海市役所です。総務課から職員採用試験についてお知らせします。 西海市では、職員採用試験を実施します。受付期間は、7月23日から8月20日までとなっております。受験申込みは市役所総務課および各総合支所で配布しております。 受験資格及び試験日など詳しくは、広報さいかい8月号または西海市ウェブサイトをご覧ください。</p>	<p>This is Saikai City Hall. We will tell about staff employment examination from general affairs section. In Saikai City, we will carry out the staff employment examination. The application period is from July 23rd to August 20th. Examination applications are distributed at the city hall general affairs section and each general branch office. For more information on eligibility and test dates, please see the August issue of the Saikai Newsletter or the Saikai City website.</p>
<p>こちらは西海市役所です。市民課から行政相談所の開設についてお知らせします。 8月13日火曜日、午前10時から午後2時まで、大島離島開発総合センターにおきまして、行政相談所を開設いたしますので、お気軽にご相談ください。</p>	<p>This is Saikai City Hall. We will tell about establishment of administrative counselor's office from citizen's section. On Tuesday, August 13th, from 10:00 am to 2:00 pm, we will open an administrative consultation office at the Oshima Remote Island Development Center, so please feel free to contact us.</p>



Fig. 1. Amazon Echo (Amazon Inc., 2017)

Amazon Echo is a smart speaker (AI speaker) provided by Amazon, and is a speaker equipped with a voice assistant. If you have a Wi-Fi connection, you can use it. To operate, start by calling with the activation word “Alexa”. And if you ask, for example, “What time is it now?”, it can respond with voice information. As a developer, you will create an Alexa skill (application).

Figure 2 shows the introduction screen of the Alexa skill “Varygood-kun”. Here, Varygood-kun is a character created by Saikai Creative Company, and the story is added that if the user asks this character for a job, it will be solved (Saikai Creative Company, 2021). With the cooperation of Saikai City Hall, we asked them to write the actual broadcast content into a cloud-based spreadsheet. Users can call and use skills. We conducted a verification test for about two months. It is currently unpublished.



explanation

The character "Barigood-kun" from VARYGOOD, a local media outlet in Saikai City, Nagasaki Prefecture, is a skill that teaches you about [Town Broadcast] in Saikai City. For example, if you say "Alexa, open Bari good-kun" and then say "Today's local broadcast", it will tell you about today's major local broadcasts. Let's talk now!

Skill details

- Contents of this skill : [Dynamic content](#) .
- Invocation Name: **bari good**
- [Developer Privacy Policy](#)
- [Developer Terms of Service](#)

Fig. 2. Created skill (application)

2.3 Transcription Varygood-kun

There are already many OCR (Optical character recognition) systems in the world that convert images into digital text. Therefore, it is considered that it is frequently used for transcription. However, in the actual field, people often input characters by hand. Since, the application seems unknown or difficult to use.

Therefore, we have developed “Transcription Varygood-kun(文字起こしぱりぐっどくん)”, which transcribes text based on the mobile messenger application LINE. LINE has 92 million active users as of August 2022, and is an application that can send messages that can be used on smartphones, etc., which is used by most Japanese people. Therefore, most Japanese users know and can use LINE's user interface.

Fig. 3 shows the transcription varygood-kun. It can be seen that there are more than 267,000 friends as of April 2023. All you have to do is become friends with transcription varygood-kun, take a picture of the document you want to transcribe, and send it to transcription varygood-kun. After a few seconds, you will receive a reply in the form of transcribed digital information text.

This application uses a technology called LINE bot. You can exchange information by exchanging messages using LINE. LINE has released an API (Application Programming Interface), and you can create an application.

LINE Official Account

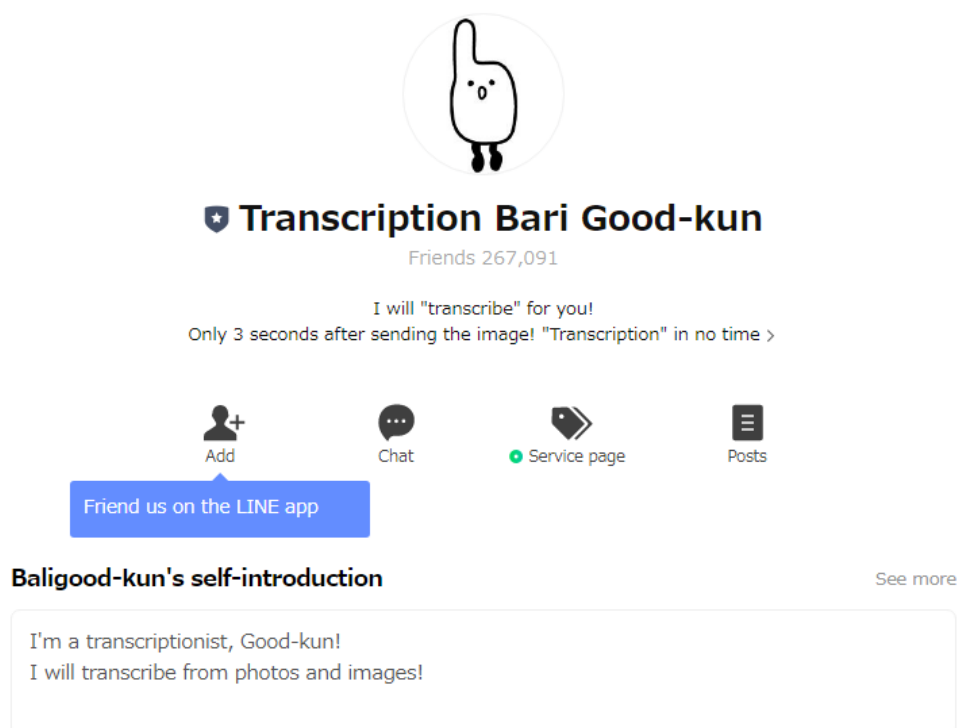


Fig. 3. Created LINE bot “Transcription Varygood-kun” (Saikai Creative Company, 2019)

2.4 E-commerce of agricultural products

We have made it possible to do e-commerce on LINE where you can buy vegetables and pickles from the "Genki Yasai Miyabi" farm. Fig. 4 shows an example of the screen of "Genki Yasai Miyabi Varygood-kun". Although it is LINE, it can be treated like a web application. Up to now, E-commerce has had high barriers to introduction for introducing companies, and maintenance has been difficult. With this application, you can register products from the familiar LINE interface. Also, from the buyer's point of view, they can use a fairly simple and familiar interface by using LINE. In some cases, you can also use LINE messages to communicate directly. This application has been released as a service called "Feel free EC 'Lea = rare'" that anyone can easily build an EC (Mito, R. 2021).



Fig. 4. Created LINE bot “Genki Yasai Miyabi Varygood-kun” (Saikai Creative Company, 2019) (Japanese)

4. Discussion

We would like you to actually become friends with “Transcription Varygood-kun” and send him a picture of the document. You must be pretty surprised. There are many OCR software available so far, and even standard software for smartphones can transcribe text. However, “Transcription Varygood-kun”, which works as a LINE bot, has a very excellent user interface, and there is a story that you can ask “Varygood-kun” in the usual message exchange. We heard that there is a user who sent a message saying “Thank you, Varygood-kun.” Such a thing is unthinkable with ordinary OCR software. In this way, the applications that use LINE that we usually use are very user-friendly, such as being very useful for users who can hardly use smartphones.

In the actual application, LINE's interface and Google's API are used. Therefore, it uses the latest AI technology, and it can be expected that the accuracy and conversion speed will improve in the future due to improvements on the Google side. In this way, the latest AI technology can be used without complicated procedures, and can be used for regional revitalization. However, since “Varygood-kun” uses the google API, it is necessary to take the same precautions as when using google to prevent information leakage. For sensitive documents, it is not recommended to

utilize“Varygood-kun”. It is advisable to restrict the usage of “Varygood-kun” to documents that are intended for public dissemination and are not of a sensitive nature.

Fig. 5 shows the number of characters transcribed in a week by “Transcription Varygood-kun” as a function of week. It is found that the average number of characters per week is over 1 million characters. In addition, the average number of images per week is about 40,000, and the total image size per week is 8GB. Therefore, it is confirmed that “Transcription Varygood-kun” is widely used by users.

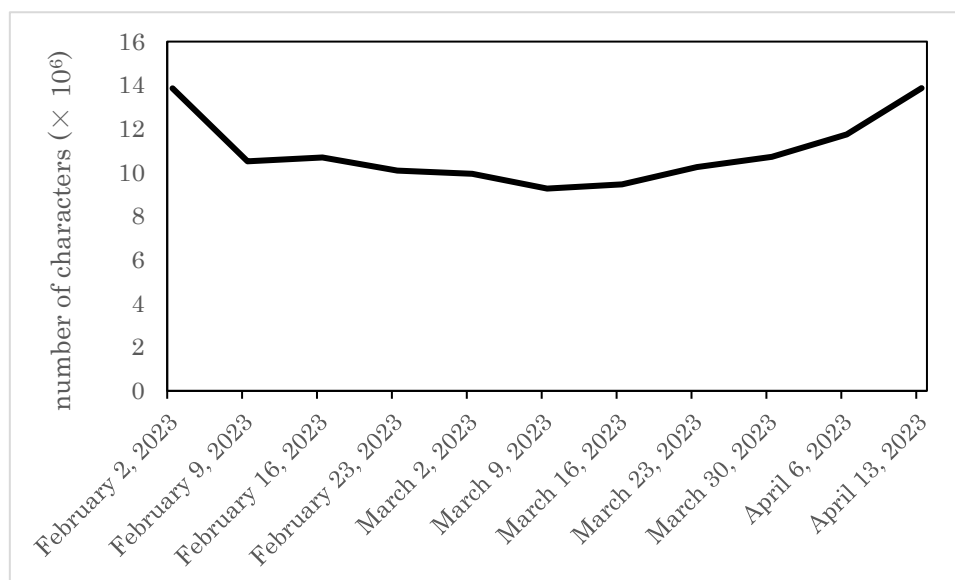


Fig. 5. Weekly change in the number of characters transcribed in a week with “Transcription Varygood-kun”.

Previous application development required design and programming for a wide variety of parts, including user interfaces and internal processing. However, in the application developed this time, it is created by programming the part that connects APIs provided by LINE and Google. As a result, it is possible to concentrate on the programming of the functions to be realized, and there is no need to program the part corresponding to the so-called platform. This information is published by each company, and there are many articles about implementation examples. This allows enthusiastic students to create serious applications.

Skilled students want the right assignments. If there is an appropriate problem, it can be solved by combining APIs of services provided in the world. Even in so-called programming contests, good problem discovery and solutions are sought. In fact, “Transcription Varygood-kun” won the Iizuka Mayor's Award at the “e-ZUKA Smartphone Application Contest 2019”. In addition, by creating applications that actually solve problems, students interacted with many people and were able to experience various difficulties in implementing applications in society. In this way, the significance of students' involvement in regional revitalization is great.

Also, from a local point of view, it is quite risky to suddenly ask a software development company to develop an application that solves a problem. Considering the time required for implementation, cost, and flexible handling, it is clear that realization is difficult. And we don't know whether the created application will actually be used. On the other hand, if you develop with students, there is a risk that it will not be realized, but you can minimize the development time and cost through frequent communication. Moreover, the internal processing accesses the latest technology, so you can expect considerable quality. As described above, there are benefits for both students and local communities, and it can be said that there is value in promoting cooperation.

In the future, technologies, services, and ideas that can be used for regional revitalization, such as Metaverse and DAO (Decentralized Autonomous Organization), are being provided, and it is expected that they can be used for regional revitalization (Saikai Creative Company (2022)).

5. Conclusions

In this research, we attempted to solve local problems with students' IT in cooperation with local governments. Services through the Internet are provided in the form of APIs. In addition, students who are not tired of studying for university entrance exams can learn application development on their own, have high skills, and can create applications that can actually be used. On the other hand, there are many problems in rural areas, and these can be solved by students' IT. Here we introduced three such cases. Among them, “Transcription Varygood-kun” is instructed by many users and is used conveniently. In the future, technologies, services, and ideas that can be used for regional revitalization, such as Metaverse and DAO (Decentralized Autonomous Organization), will be provided and are expected to be used for regional revitalization.

Author Contributions

Conceptualization, E.S.O.; methodology, E.S.O., Y.H., and T.M.; software, Y.H. and T.M.; validation, Y.H., and T.M.; investigation, E.S.O. Y.H. and T.M.; writing—original draft preparation, E.S.O.; writing—review and editing, E.S.O. and Y.H.; supervision, E.S.O.; project administration, E.S.O.

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Informed Consent Statement

Informed consent was obtained from all participants involved in the study.

Conflicts of Interest

The authors declare no conflict of interest.

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