Abstract

In this paper, we construct a new Japanese speech corpus for speech-based summarization and simplification, "JSSS" (pronounced "j-triple-s"). Given the success of reading-style speech synthesis from short-form sentences, we aim to design more difficult tasks for delivering information to humans. Our corpus contains voices recorded for two tasks that have a role in providing information under constraints: duration-constrained text-to-speech summarization and speaking-style summarization. It also contains utterances of long-form sentences as an optional task. This paper describes how we designed the corpus, which is available on our project page.

Index Terms: speech corpus, Japanese, speech summarization, speaking-style simplification, text-to-speech

1. Introduction

Text-to-speech (TTS) synthesis achieved to synthesize human-quality speech [1, 2, 3] in very limited tasks (e.g., reading-style speech synthesis from short-form sentences of some rich-resourced languages). Both open-source code and open speech corpora help open innovation of speech-based technologies. Since 2017, we have released high-quality and large-scale Japanese speech corpora. The JSUT and JSUT-song corpora [4,5] are for speaking/singing-voice synthesis, and the JVS and JVS-MuSiC corpora [6,7] are for multi-speaker/singer modeling. Open projects [8,9,10,11] developed by third parties provide synthesis engines and machine learning recipes using our corpora.

With the success of reading-style speech synthesis from short-form sentences, we aim to design two challenging tasks for delivering information to humans: 1) duration-constrained text-to-speech summarization and 2) speaking-style simplification. The former summarizes text by a spoken language at a desired duration, and the latter synthesizes speech intelligible for non-native speakers. These tasks help provide information under the constraints of time limitations or language proficiency. They are challenging because their speech characteristics are far from those of basic reading-style speech.

For these tasks, we developed a new Japanese speech corpus, JSSS (pronounced "j-triple-s"). Our corpus composes speech data and its transcription. We recorded speech with high-quality settings: studio-recording, uncompressed audio format, and a well-experienced native speaker. We also recorded speech of short- and long-form sentences as an optional task. Our corpus has eight hours of high-quality speech data and is available at our project page [12]. From the next section, we describe how we designed the corpus.

2. Corpus design

Our corpus consists of the following four sub-corpora.

- **summarization**: 125 utterances for duration-constrained text-to-speech summarization
- **simplification**: 184 short utterances spoken in slow, intelligible style
- **short-form**: 3284 short utterances spoken with read style
- **long-form**: 168 long utterances spoken with read style

The directory structures of the corpus are listed below. [SUB_DIR_NAME] indicates the sub-directory described in the following sections.

```
    wav24KHz16bit
    transcript_utf8

    simplification
    wav24KHz16bit
    transcript_utf8.txt

    short-form
    [SUB_DIR_NAME]
    wav24KHz16bit
    transcript_utf8.txt
    ...

    long-form
    [SUB_DIR_NAME]
    wav24KHz16bit
    transcript_utf8
    ...
```

2.1. Summarization

Automatic text summarization generates a short, coherent summary of given text [13, 14]. Shortening it while retaining its important content. Text-length-constrained text summarization [13] is text summarization technology that has practical application; it abstractively summarizes text to fit a device that displays a summary [16]. Against such textual length constraints, this sub-section addresses speech length constraint. Namely, we propose a new task named speech-length-constrained or duration-constrained text-to-speech summarization. It abstractively summarizes text with a spoken language to fit a desired speech duration.

We recorded speech for this task. The text to be summarized was web news, which we saved in original_utf8/*.txt. Our speaker summarized the texts and uttered them to fit duration that the speaker chose in advance. The durations chosen for each text were around 30 and 60 sec. We did not set time limits for recording, and the speaker could re-record as many times as needed. After the recording, first, we manually transcribed the speech. Then, we manually added punctuation at the phrase breaks and added sentence-level time alignment as shown below. We saved the transcription in transcript_utf8/*.txt.
2.2. Simplification

Given the effect the global pandemic has had on Japan in 2020, there is a question of how we can convey emergency and lifeline information to the approximately three million foreign residents living in Japan [17]. The Immigration Services Agency of Japan and the Agency for Cultural Affairs reported that many foreign residents prefer simple Japanese rather than English for information services [18]. “Simple Japanese” speech is much different from standard reading-style speech. “Simple Japanese” sentences use daily-use phrases with a limited vocabulary and are uttered in a slow, intelligible style [19]. Text simplification with lexical constraint [20] can potentially artificially simplify vocabulary in text. On the other hand, here we deal with speaking-style simplification, which aims to artificially synthesize speech in a slow, intelligible style. Therefore, we instructed a speaker on the speaking style and recorded speech of simple, pre-designed sentences. An example is below.

おおきいじしんがおきました
I feel hopeful that next year will be bright, fun, and happy.

In this sub-corpus, we saved the original text in original_utfl8/*.txt and transcription in transcript_utfl8/*.txt. Note that, punctuation in the transcribed text was inserted at the phrase breaks, so the positions differ from that of the original text.

3. Results of data collection

3.1. Settings

We hired a female native Japanese speaker who is not a professional speaker but has voice training. We recorded her voice in an anechoic room at the University of Tokyo using an iPad mini with a mounted SHURE MV88A-A microphone. The first author directed the recording. Her voice was originally sampled at 48 kHz and downsampled to 24 kHz by SPTK [22]. We recorded in 24-bit/sample RIFF WAV format and encoded in 16-bit/sample format. Sentences (transcriptions) were encoded in UTF-8. For duration-constrained text-to-speech summarization, we used the Livedoor New Corpus [23] as the original text to be summarized. For speaking-style simplification, we followed text and speaking-style instructions provided by Hirosaki University[2]. For long-form utterances, we used three featured Japanese articles from Wikipedia: Sanuki udon

2We downloaded them from [http://human.cc.hirosaki-u.ac.jp/kokugo.html](http://human.cc.hirosaki-u.ac.jp/kokugo.html) but currently they are not available because the laboratory was closed in 2020.
Table 1: Statistics of sub-corpora.

| Sub-corpus          | Style           | #utterances | Duration [hour] | Duration / utt. [sec] |
|---------------------|-----------------|-------------|----------------|----------------------|
| summarization       | news-reading    | 125         | 1.69           | 48.8                 |
| simplification      | slow-speaking   | 184         | 0.26           | 5.09                 |
| short-form          | reading         | 3284        | 4.03           | 4.42                 |
| long-form           | reading         | 168         | 2.35           | 50.4                 |
| **Total**           | **-**           | **3761**    | **8.33**       | **7.97**             |

(soft-flour noodles of Japanese cuisine), Masakazu Katsuura (Japanese manga artist), and Washington, D.C. (capital of the United States).

3.2. Statistics

Table 1 lists the number of utterances and durations for each sub-corpus. “Simplification” and “short-form” consist of short utterances approximately 5 seconds per utterance. “Summarization” and “long-form” consist of utterances approximately 50 seconds per utterance, approximately 10 times longer than short utterances. The total duration is approximately 8 hours, which is slightly shorter than our previous corpus [4] designed for the end-to-end TTS.

4. Conclusion

In this paper, we constructed the JSSS voice corpus. We designed the corpus for text-to-speech summarization, speaking-style simplification, and short-/long-form TTS synthesis.

5. License

The text files are licensed as below.

- summarization/ ... CC BY-ND 2.1 [23]
- simplification/ ... No commercial use
- short-form/ ... CC BY-SA 4.0 etc [24]
- long-form/ ... CC BY-SA 4.0

The speech files may be used for

- Research by academic institutions
- Non-commercial research, including research conducted within commercial organizations
- Personal use, including blog posts.

6. Acknowledgements

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7. References

[1] A. v. d. Oord, S. Dieleman, H. Zen, K. Simonyan, O. Vinyals, A. Graves, N. Kalchbrenner, A. W. Senior, and K. Kavukcuoglu, “WaveNet: A generative model for raw audio,” vol. abs/1609.03499, 2016.
[2] Y. Wang, R. J. S.-Ryan, D. Stanton, Y. Wu, Ron J. Weiss, N. Jaitly, Z. Yang, Y. Xiao, Z. Chen, S. Bengio, Q. Le, Y. Agiomyrgianakis, R. Clark, and R. A. Saurous, “Tacotron: Towards end-to-end speech synthesis,” in Proc. INTERSPEECH, Stockholm, Sweden, Aug. 2017, pp. 4006–4010.
[3] Y. Saito, S. Takamichi, and H. Saruwatari, “Statistical parametric speech synthesis incorporating generative adversarial networks,” IEEE/ACM Transactions on Audio, Speech, and Language Processing, vol. 26, no. 1, pp. 755–767, Jun. 2018.
[4] R. Sonobe, S. Takamichi, and H. Saruwatari, “JSUT corpus: free large-scale Japanese speech corpus for end-to-end speech synthesis,” arXiv preprint, 1711.00354, Oct. 2017.
[5] “JSUT-song corpus,” https://sites.google.com/site/shinnosuketakamichi/publication/jsut-song.
[6] S. Takamichi, K. Mitsui, Y. Saito, K. Koriyama, N. Tanji, and H. Saruwatari, “JSV corpus: free Japanese multi-speaker voice corpus,” arXiv preprint, 1906.06248, Aug. 2019.
[7] H. Tamaru, S. Takamichi, N. Tanji, and H. Saruwatari, “JSV-MuSiC: Japanese multispeaker singing-voice corpus,” arXiv preprint, 2001.07044, Jan. 2020.

8. “NEUTRINO,” https://n3utrino.work/

[9] S. Watanabe, T. Hori, S. Kariya, T. Hayashi, J. Nishitoh, Y. Unno, N. E. Y. Soplin, J. Heymann, M. Wiens, N. Chen, A. A. Renduchintala, and T. Ochiah, “ESPnet: End-to-end speech processing toolkit,” in Proc. INTERSPEECH, Sep. 2018, pp. 2207–2211.
[10] T. Hayashi, R. Yamamoto, K. Inoue, T. Yoshimura, S. Watanabe, T. Toda, K. Takeda, Y. Zhang, and X. Tan, “Esnet-TTS: Unified, reproducible, and integratable open source end-to-end text-to-speech toolkit,” in Proc. ICASSP, May 2020, pp. 7654–7658.

[11] “NN-SVS,” https://github.com/fzy9/nnsvs.

[12] “JSSS: Japanese speech corpus for summarization and simplification,” https://sites.google.com/site/shinnosuketakamichi/research-topics/jsss_corpus.

[13] B. Dorr, D. Zajic, and R. Schwartz, “Hedge trimmer: A parse-and-trim approach to headline generation,” in Proc. HLT-NAACL 03 Text Summarization Workshop, Edmonton, Canada, 2003, pp. 1–8.
[14] Michele Banko, Vibhu O. Mittal, and Michael J. Witbrock, “Headline generation based on statistical translation,” in Proc. ACL, Hong Kong, China, 2000, pp. 318–325.
[15] T. Makino, T. Iwakura, H. Takamura, and M. Okumura, “Global optimization under length constraint for neural text summarization,” in Proc. ACL, Florence, Italy, Jul. 2019, pp. 1039–1048.
[16] I. Saito, K. Nishida, K. Nishida, A. Otsuka, H. Asano, J. Tomita, H. Shindo, and Y. Matsumoto, “Length-controllable abstractive summarization by guiding with summary prototype,” arXiv preprint, 2001.07331, Jan. 2020.
[17] Immigration Services Agency of Japan, “Guideline of “simple Japanese” for residence support,” in Proc. ACL, Florence, Italy, Jul. 2019, pp. 1039–1048.
[18] Immigration Services Agency of Japan and Agency for Cultural Affairs, “Guideline of “simple Japanese” for residence support,” http://www.moj.go.jp/content/001327230.pdf (in Japanese).
[19] M. Shibata, “The NHK monthly report on broadcast research,” Aug. 2007.
[20] D. Nishihara, T. Kajiwara, and Y. Arase, “Controllable text simplification with lexical constraint loss,” in Proc. ACL: Student Research Workshop, Florence, Italy, Jul. 2019, pp. 260–266.
[21] “Wikipedia,” https://ja.wikipedia.org/
[22] “Speech signal processing toolkit (SPTK),” http://sp-tk.sourceforge.net/
[23] “Livedoor news corpus,” http://www.rondhuit.com/download.html#ldcc
[24] “JSUT: Japanese speech corpus of Saruwatari Lab, the University of Tokyo corpus,” https://sites.google.com/site/shinnosuketakamichi/publication/jsut