The modified selection rule of the second order memory-based LT code

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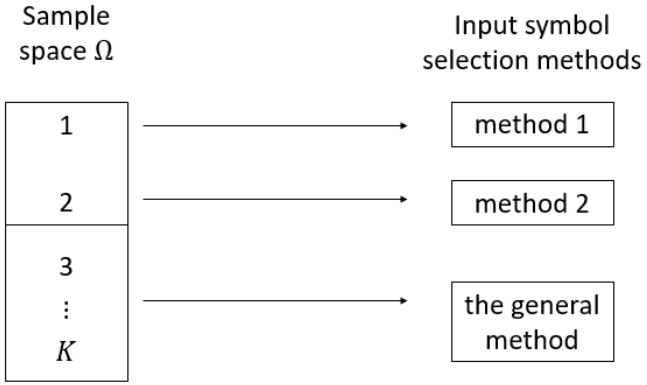
1. Introduction

- Memory based LT (MBLT) code [1] is a kind of LT code and outperforms the original LT code.
- MBLT code utilizes the memory of encoder and generates the encoded symbol by some selection rules.
- In this paper, we propose a modified selection rule of the 2^{nd}-order MBLT code [2].

2. 2^{nd}-order MBLT code [2]

- **System model**
  - K information symbols
  - 2^{nd}-order MBLT encoder



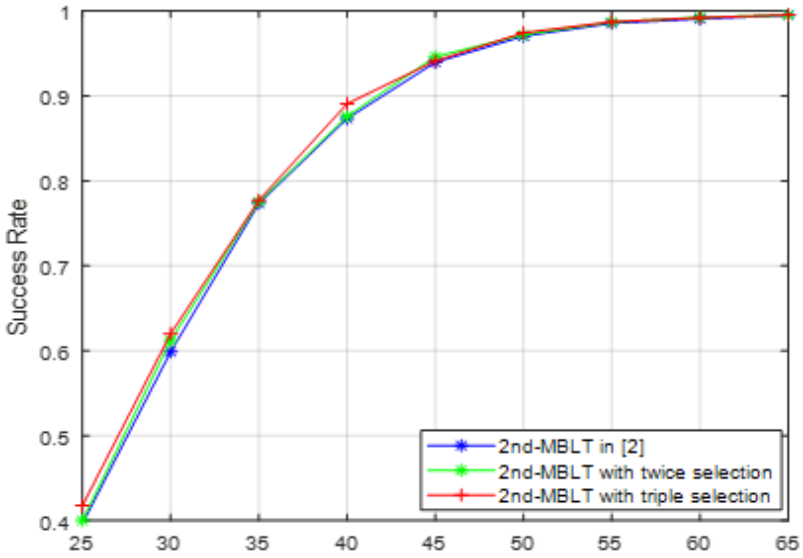
  - Binary erasure channel with erasure probability λ
  - BP decoding by N received symbols

3. Modification of 2^{nd}-order MBLT code

- For BP decoding, the step of process should keep generating the new encoded symbol with degree 1 to ensure decoding success.
- The encoded symbol with degree 2, whose first neighborhood is selected from S_1, can be released immediately when the information symbol in S_1 is recovered.
- Therefore, we propose that the symbol in S_1 can be selected multiple times.

4. Simulation result

- $\mathrm{K} = 100,\ \mathrm{c} = 0.1,\ \delta = 0.5,\ \lambda = 0.3.$



- **Selection Method**
  - method 1:

    select the information symbol with the highest instantaneous degree except for the symbols in set S_1 and S_2.

  - method 2:
    - the first neighborhood symbol

      select uniformly from the set S_1 without replacement;
    - the second neighborhood symbol

      select the information symbol with the highest instantaneous degree except for the symbols in set S_1 and S_2;

    If no symbol can be selected from the set S_1, selected by the general method.

  - the general method:

    select d_r symbols uniformly from all the information symbols.

where S_1 is the set of the information symbols that is selected by the encoded symbol with degree 1;

and S_2 is the set of the information symbols that is the 2^{nd} information symbol of the encoded symbol with degree 2 whose 1^{st} information symbol is selected from the S_1.

Percentage Overhead

The success rate of the 2^{nd} -MBLT code with triple selection is better than others, but the gap is small.

5. Conclusion

- We use the multiple selection for some special symbols, which improves the decoding success.

- **Reference**

[1] K. Hayajneh, S. Yousefi, and M. Valipour, "Improved finite-length Luby-Transform codes in the binary erasure channel," IET Communications, vol. 9, no. 8, pp. 1122–1130, 2015.

[2] Zhi Jing, Inseon Kim, Hong-Yeop Song, "The modified construction of the second order memory-based LT code," 2018년 한국통신학회 추계종합학술발표회, 고려대학교, 2018년 11월 17일.