

KaTaPaYadi System

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The kaṭapayādi (कटपयादि) system of encoding numbers as words by replacing each digit by a character was developed in ancient India. The name कटपयादि stems from the fact that each of the क, ट, प, य characters are assigned the number 1. The successive characters are assigned the numbers 2, and so on. The details of the entire scheme can be found at https://en.wikipedia.org/wiki/Katapayadi_system.

Due to one-to-many mapping of a digit to a set of characters, a number can be represented in multiple ways. A nice word or a phrase is generally chosen such that it is easier to remember. A famous example of this is “भद्राम्बुद्धिसिद्धजन्मगणितश्रद्धा स्म यद् भूपगीः” in sadratnamālā of śaṅkaravarmā. In the kaṭapayādi system, this evaluates to 314159265358979324, denoting the value of π up to 17 decimals. A modern use of this system can be for remembering numbers in daily use, such as phone numbers, birth dates, etc.

We present a web-based system that uses the kaṭapayādi numbering scheme. It can both decode a word into its corresponding number, and can encode a number into word(s). While decoding is easy since each character represents only a single digit, encoding is tricky since there can be many possible combinations.

In our current system, we take a data-driven approach to encode numbers. We use multiple saṁskṛta corpora. We decode all the words in the corpora and store them in an inverted index. In addition to single words, we store the corresponding decoded numbers for bi-grams and tri-grams as well.

When a number needs to be encoded, we first search the inverted index to see if a direct match exists. If not, we break the number into multiple parts, and try to find matches for each of the constituent parts. The encoded words are guaranteed to be grammatically correct since they appear in an actual saṁskṛta text. The resulting combination of words, however, are rarely meaningful since arbitrary words may be combined.

In our system, users can specify using one or more particular corpora, and can also specify their preferences for splitting the number into a large or small number of words. The system also allows a user to upload her own corpus.

The demo is currently available at <https://sanskrit.iitk.ac.in/jnanasangraha/sankhya/katapayaadi/>. The upload corpus feature is disabled due to restrictions on the host website.

The following screenshots show examples of decoding a text (Figure 1) and encoding a number (Figure 2).

<https://sanskrit.iitk.ac.in/jnanasangraha/sankhya/katapayaadi/decode/>

KaTaPaYadi System

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Decode text

भद्राम्बुद्धिसिद्धजन्मगणितश्रद्धा स्म यद् भूपगीः

Submit

KaTaPaYadi Number

314159265358979324

Split	भ	द्	रा	म्	बु	द्	धि	सि	द्	ध	ज	न्	म	ग	णि	त	श्	र	द्	धा	स्	म	य	द्	भू	प	गी	
Relevant	भ	र	ब	ध	स	ध	ज	म	ग	ण	त	र	ध	म	य	भ	प	ग										
Numbers	4	2	3	9	7	9	8	5	3	5	6	2	9	5	1	4	1	3										

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Figure 1: Decoding Sanskrit text using kaṭapayādi system.

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Select corpora

रामायणम्
महाभारतम्
भावप्रकाशनिघण्टुः
श्रीमद्भागवतम्

Preferred number of words

Small

Encode number

15081947

Submit

KaTaPaYadi Encodings

संविधास्ये जानीमः कः
संवृद्धो यदग्निमपि
संविधाय जानीम की
संविधिम् कदा नाम कं
संविधाय दनोः शिष्टैः
संविधिम् न्यहनं मर्थ्यं
त्स वधं यदूनाम् मियां
स विधूय ह अमात्यो
संवृद्धो योऽहं ईशोऽयं
साध्वी धन्यो हि अशक्यो

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Figure 2: Encoding a number using kaṭapayādi system.