

A WordNet for Tulu

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Abstract

Tulu WordNet is an attempt to build a lexical resource for Tulu language using IndoWordNet as a base. The issues and problems in building a WordNet for Tulu are discussed in brief with proper examples.

1 Introduction

Tulu is a Dravidian language of India with over three million speakers in Karnataka [karnāṭaka], known as Tuḷuvas [tuḷuwaru]. It is one of the oldest languages which sprout from the proto south-Dravidian subgroup. According to linguists Tulu is as old as Prākṛit. Most Tuḷuvas live in the districts of Dakshina Kannaḍa and Udupi [uḍupi] in the west of the state of Karnataka [karnāṭaka]. It is also spoken in the Kasaragod [kāsaragōḍu] district of Kerala [kēraḷa] state. There are a sizeable number of Tuḷuvas in the gulf as well as in Mumbai and other parts of Maharashtra [mahārāṣṭra]. The originally used script of the Tulu language, which was an adapted from of the Grantha Script and from which the present day Malayalam script also evolved, is rarely used today. Since the beginning of the twentieth century, it has, mostly, been written in the modified Kannaḍa script.

1.1 Geographic Distribution

The scholars have divided Tulu speaking region into five geographical areas, i.e. northeast (covers Karkala [kārkala] and Belthangadi [belṭaṅgaḍi] Taluks), northwest (Covers Udupi and Mangalore), South central (Covers Bantwala [baṅṭwāḷa] and Puttur [puṭṭūru] area), southeast (covers Sullia [sulḷiya] and subrahmanya) and south west (covers Manjeswara [maṅjēśwara] and Kasaragod [kāsaragōḍu] of Kerala [kēraḷa]). There are several caste groups in each area which distinguish primarily the four major divisions: Brahmin (ṣiwaḷḷi and ṣaiwa), Common Group castes (including castes such as bunt, billawa,

gauḍa, mogawīra), Jaina, and the rest (Harijans and tribals). Accordingly, four sociolects have been recognized. Those are Brahmin Dialect, Common dialect, Jaina Dialect, and Harijan and Dalit Dialect. There is a tendency among speakers of the fourth group to abandon their own caste dialects and adopt the common variety of their area, particularly in the north. Brahmins, at the other end of the social spectrum, generally maintain their distinctive caste dialect, and use Common Tulu only for communicating with other, non-Brahmin Tulu speakers.

1.2 Script

Tulu has been written in two orthographic systems. Old Tulu script is an early adaptation of Grantha script used by Tulu Brahmins traveling to Kerala to study Sanskrit texts. Inscription in Tulu script have been discovered and dated to the fifteenth century. The two epics Sri Bhagawato [bhāgawatō] and Kaweri [kāwēri] both from the seventeenth century were originally set down in this script. To retain these texts and some other writings, old Tulu script has been primarily used by handful of Brahmins to transcribe Sanskrit texts, a practice that continues to the present. It is otherwise no longer used for writing or publishing Tulu texts. During the early nineteenth century, Christian missionaries introduced Kannaḍa script for Bible translations and other related materials. The practice continues and is followed in Brigel's (1872) Tulu grammar, Manner's (1886 & 1888) dictionary of Tulu and Paniyadi's (1932) Tulu grammar. The renaissance of Tulu writing in the twentieth century has further consolidated the practice of using Kannaḍa script for Tulu.

Recently, serious attempts were made by Tulu traditional scholars to revive the original script. The movement is not successful and the efforts have been failed to the extent that it may not reoccur again. In the light of the fact, the project will go with modified Kannaḍa script.

Existing modern literature in Tulu is available only in modified Kannada script and it is the only available hard copy corpus available for the present day Tulu.

1.3 Major Linguistic Features

Tulu has three morphologically distinct word classes: nouns, verbs and indeclinables. The language has only two types of inflectional suffixes: nominal suffixes and marking number and case, and verbal suffixes marking such categories as causative, reflexive, completive; tense and mood; and person, number and gender. Indeclinables, including what have been called adjectives and adverbs, generally take no inflection when they are used to modify nouns and verbs.

Tulu has eight cases, of which the nominative is unmarked. The remaining seven are signaled by case markers suffixed directly to the nominal base in the singular and to the plural marker in the plural. Tulu is a tense prominent language in which the verbal inflections fundamentally denote tense distinctions. Distinctions of mood and aspect are conveyed by auxiliary verb construction or by secondary usages of tense markers.

2 Building the Tulu WordNet

Aim of the project is to develop an e-lexical reference resource for the Tulu language i.e., Tulu WordNet. The project has been inspired by the landmark electronic lexical reference resource developed for English by the team of Cognitive linguists at Princeton University, headed by George A Miller, known globally by the name 'WordNet', unmarked meaning of which is English WordNet.

The design of the project is based on the Indo WordNet, unmarked meaning of which is Hindi WordNet, developed by the Dipak Kumar Narayan and team.

Tulu being a non-scheduled language of India does not have many linguists working fulltime on it. And as the consequent result we find nil work on the lexical studies in Tulu. The concept of synonymy, antonymy, hypernymy, hyponymy, meronymy, and holonymy are not well exercised in the Tulu linguistic studies.

As a result, developing a WordNet for Tulu takes lot of exercise of the above mentioned theoretical notions independently throughout the project. To avoid the unusual span of time delay the Tulu WordNet is being built on the basis of Hindi WordNet.

The project is not officially initiated, yet, at Dravidian University. However, at personal capacity the project has been initiated before three months and awaiting to be funded. The project is very much at an initial stage. The project was initiated with 1969 synsets provided by the IndoWordNet team.

We are initially concentrating on developing the synsets at the earliest. Till now, without having project personnel, other than the principal investigator and the co-investigator 909 synsets have been completed. Care has been taken to collect native synsets too. Categorical details of the completed synsets are as follows:

Total Synsets ☐	Synset – Taken	Synsets – Completed
Classified Synsets ☐	1969	0909
nouns	1512	0722
verbs	0225	0057
adjectives	0180	0107
adverbs	0052	0023

The completed synsets have been data entered into the Indian Language Multilingual Sense-Based Dictionary Development Tool (IL-Multidic tool Jan 2007) developed by IIT Bombay (IndoWordNet team).

2.1 Methodology

Effort has been made to give equivalents to the Hindi synset as well as for illustrations. However, while giving equivalents to the Hindi synsets we are referring to the English synsets too. The 1969 synsets provided by the Indo WordNet are already linked with English synsets of Princeton University WordNet. Giving equivalent to the concept in Tulu and later finding synonyms for the word in Tulu are having its own theoretical problems which are discussed in the forthcoming sections (cf. 2.2.1).

As a part of methodological adequacy we are at a time giving equivalents both in Tuḷu and Kannaḍa. This process overloads the project with double work. But the process allows us to cross check with Kannaḍa, whenever there are problems in recognizing compounds (compound nouns, compound verbs, or compound adjectives), multiword lexical units and phrasal lexemes which are idiomatic by meaning (in all categories). In future we would like to tag up with Kannaḍa WordNet Project. Negotiation in the respect is going on. It will be conclusive when the project is officially initiated.

2.1.1 Resources for Tulu WordNet

Resources from Tuḷu linguistics and lexical studies to develop any computerized data bases for Tuḷu are very less. The project pools up whatever the available resources which are given in the subsections below as part of the methodological process applied in the project. These are the existing resource reference works which are considered and in hand to develop the Tuḷu WordNet. As we have already mentioned that we do have lack of resources and we are working with whatever the minimum resources that we do have. Three resources those we can mention are dictionary resources, corpus resources and reference resources, details of which are given in the following section.

2.1.1.1 Dictionaries

A handful of dictionary resources which were developed in different span of the late second millennium starting from late nineteenth century, are the only resources. A landmark publication in the late twentieth century is the major resource. All those works are listed below.

Two dictionaries (Tuḷu-English & English-Tuḷu) compiled by Manner (Manner 1886 & 1888)

Tuḷu lexicon Vol – 1 to 6 (Tuḷu-Kannaḍa-English Upadhyaya (1988, 1992, 1995, 1997a, 1997b, & 1999)

Tuḷu-English dictionary of Madras University (Mariappa Bhat, M & Shankar Kedilaya, A. 1967)

Bernard Kolver's Tuḷu glossary (Kolver 1969)

Shivakumar's common Man's Multilingual dictionary (A Pocket dictionary) (Shivakumar, B S et al. 2008)

Certain Kannaḍa resources are also kept on the side line to the project, which are as follows:

English-Kannaḍa dictionary of Mysore University publication

Mysale's Hindi-Kannaḍa dictionary

2.1.1.2 Corpus

We have two hard copy publications with respect to the corpus resource, which are:

1. Janert, Klaus Ludwig & Narasimhan Poti, N. 1981
2. Kolver, Bernhard. 1969.

Out of the two former one is the corpus of Tuḷu folk songs and poetry with English translation and glossary and later one is the corpus of Tuḷu folk tales with English translation and glossary, which are supposed to be converted into soft copies by direct data entry method. To get the copy-right for the process, we are still waiting for funding.

Other than these the Rashtrakavi Govinda Pai Research Centre, an NGO at Udupi, Karnataka [karnāṭaka] has published certain books in Tuḷu using Kannaḍa script and the soft copies of those books are available in the centre. Still negotiation with the NGO is going on for utilizing their soft copies of the books as corpus. We did not receive the complete statistical details of the word count from them.

In the same way Karnataka [karnāṭaka] Tuḷu Sahithya Academy, the state Government body has published few books in Tuḷu with Kannaḍa script and we are negotiating with them to utilize the soft copies of those books for the Tuḷu corpus. A complete statistical detail of the word count is not available yet.

Dravidian University published eight books in Tuḷu, including the one of the work by the present researcher, soft copies of which is available, so that we can utilize them as raw corpus. Word count is around 70,000. Certain private authors are also publishing Tuḷu books

in Kannada script, but how many of them still maintaining the soft copy of those books are still under survey. Until the project gets funded we have to hold up the negotiation on remuneration grounds. However, a rough sketch of the word count may be around 250,000.

At this stage utilizing the corpus for developing synsets and finding equivalent is not practically applied. We need to pool up the above mentioned resource for the purpose and to develop soft version of it. It will be a byproduct of this project.

2.1.1.3 Reference resources

For the structural aspects of Tuḷu language and word formation rules of Tuḷu Shetty's (2001), Paniyadi's (1932) and Brigel's (1872) grammars are considered as reference grammars. For lexical studies in Tuḷu Acharya 1983, Dey & Shetty 1976, Kekunnaya 1995, Shetty 1986, 1992, 1983, 2003 are considered as basic works on Tuḷu language.

2.1.1.4 Morphological Tools

Till now, to my knowledge, no computational tools like morphologic parsers or generators are developed for Tuḷu. In future the project may attempt to develop certain tools as byproduct of the WordNet project.

2.2 Issues and Problems of building Tuḷu WordNet

2.2.1 Theoretical issues

2.2.1.1 Finding Synonyms - Lexical Category in Tuḷu

Adjectival synsets pose specific problems in providing equivalent from Hindi and English. Moreover, they result into new synsets too. For Example:

Hindi ID 27:

CAT :: adjective

CONCEPT :: jise buddhi na ho yā bahut kam ho

EXAMPLE :: “mūrkh logom se bahas nahim karni cahie”

SYNSET-HINDI :: mūrkh, bevakūph, mūḍh, buddhū, ujabak, jaḍ, bhoṁdū, gāvār, nāsamakṣ, nādān, ajñāni, buddhihīn, budhmgaḍ, mūrakh, bhucc, bhuccaḍ, ahamak, bāwalā, bāwarā, poṁgā, aṁdh, acatur, acet, ajñān, besamakṣ, cūtiyā, ghanacakkar, bhakua, bhakuwā, anasamakṣ, jāhīl, apamḍit, camḍul, gāwadī, bilallā, matihīn, mūḍhātā, mūḍhamati, muhir, abudh, abukṣ, abūkṣ, abodh, cabhok, baklol, ghoṁgha, nirbuddhi, ayānā, cugaḍ, mūsalarāṁd, mūsararāṁd, śīn, bāṁgaḍū, mugdhamati, pāsar, arbhak, arabhak, alpabuddhi, awicakṣaṇ, avid, avidh, avidvān, mūsar, avibudh

English ID 2655665

CAT :: adjective

CONCEPT :: devoid of intelligence

EXAMPLE :: "the shrieking of the mindless wind"

SYNSET-ENGLISH :: asinine, fatuous, inane, mindless, vacuous

Equivalent synset of Tuḷu will be as follows:

CAT :: adjective

CONCEPT :: buddi dāmtināmcina attida buddi kammi uppunāmcina

EXAMPLE :: “heḍḍi janakkule sahaṁwāsa āṁwāḍi” ‘company of asinine folks is no good’

SYNSET-TUḷU:: heḍḍi, eḍḍi, peddu, aṁḍe, bajibaḍḍi, daḍḍi, bōsi, bajiboddu, detti pāḍina, teriyāḍina, matidāmtina, matiyijjāḍina, taredāmtina, tareyijjāḍina, ariwudāmtina, ariwuyijjāḍina, tiḷuwalikedāmtina, tiḷuwaḷikeyijjāḍina, buddidāmtina, buddiyijjāḍina, prajñedāmtina, prajñeyijjāḍina, wiwēkadamtina, wiwēkayijjāḍina, awiwēki, maṁdabuddi, mūrka,

There are 27 lexical items in this synset which are good enough to fill the adjectival slot given in the example sentence. Hindi is having more than 60 synonyms. English is having 5.

However, 5 lexical items given aṁḍe, bajiboddu, detti pāḍina, awiwēki, and maṁdabuddi, are nouns also.

Here the concept homonymy plays role and these lexical items are suppose to be taken into the relevant synset of nouns with the concept ‘a human / person who is devoid of intelligence’. Here we get a new synset.

The 15 synonyms of the synset, teriyaṁdina, matidāṁtina, matiyijjaṁdina, taredāṁtina, tareyijjaṁdina, ariwudāṁtina, ariwuyijjaṁdina, tiḷuwaḷikedāṁtina, tiḷuwaḷi-keyijjaṁdina, buddidāṁtina, buddiyijjaṁ-dina, prajñedāṁtina, prajñeyijjaṁdina, wiwēkadamṁtina, and wiwēkayijjaṁdina, are extracted from the noun inflection process through which any given noun in Tuḷu produces adjectival forms. All these forms are negative forms of the nouns which means ‘without the [meaning of noun]’. These are the output forms of the regular inflection process that every regular noun in Tuḷu undergo and yield paradigms. Hopefully it is the same case with other Dravidian languages too.

At present we are adding all such type of forms to the synsets, but still we are not sure that it fits the theory and practice of the Global WordNet family. So this paper calls for the suggestions from the WordNet family of linguists to opionate on this specific issue.

The adjectival lexemes heḍḍi, eḍḍi, peddu, bajibaḍḍi, daḍḍi, and bōsi, produces nouns two per each with masculine and feminine markers which are as follows:

Masculine set: heḍḍe, eḍḍe, pedde, bajibaḍḍe, daḍḍe, and bōse ‘a male who is devoid of intelligence’

Feminine set: heḍḍi, eḍḍi, peddi, bajibaḍḍi, daḍḍi, and bōsi ‘a female who is devoid of intelligence’

Therefore, here again we are getting another two synsets. However, since our work is based on Hindi synsets which are tagged or linked to English synsets, our search for the synsets with concepts ‘a human / person who is devoid of intelligence’, ‘a male who is devoid of intelligence’, and ‘a female who is devoid of intelligence’ did not yield result. We are preserving these lexical items with a note that these are the synsets sprout out of the Indo WordNet synset ID 27. The ID numbering process for the new synsets awaits the regular methods followed in the Global WordNet family. Rather than keeping them pending to attend at the end, if we can accommodate them immediately it helps to simplify the methodological practice.

2.2.1.2 Recognizing Compound Verbs

As we have already mentioned that lexical studies are not there for Tuḷu we need to recognize many compound verbs which are not listed in the Tuḷu dictionaries. However, we need to develop criteria to recognize the compound verbs which are highly active during actual communication in Tuḷu.

Eg: 1 detti pāḍina ‘vacuous’ ID 27

In this example the form /detti/ is past participle of the verb /deppu/ ‘lift up’. The form /pāḍina/ is the relative participle of the verb /pāḍi/ ‘drop’. Historically this must be a syntactic construction; however, now it is a lexical item belonging to the category of adjectives.

Eg: 2 pado paṇu ‘sing’ ID 236

In this synset regular verb pāḍu ‘sing’ is also there. pado paṇu ‘sing’ literally mean that ‘say a song’ [pado ‘song’ + paṇu ‘sing’]. This is semantically a near synonym and to pāḍu ‘sing’. However, a speaker may choose a particular item depending upon the context.

The process of recognizing such compounds requires linguistic rules. Till now we are managing with the native speaker’s intuition to detect such compound synonyms. We need to get work on the nature of compounding with relevant consultants.

2.2.1.3 Recognizing Phrasal Lexical Items

Phrasal lexical items are also not included in the standard Tuḷu dictionaries. These lexical items are also important in developing an efficient WordNet.

Eg: karakailu pidāyi ‘evacuation’ literally meaning “threw out the vessels and other utensils”

bētāla lekka untu ‘stand like a fool’

2.2.2 Standard Style Related Issues

As already mentioned, since Tuḷu is not a constitutionally scheduled language in India and its usage in written medium is just a

century old. We still find the issues of Standard style to be used for the collection of the lexical items for the WordNet. Tuḷu has a minimum of five regional dialects and four recognizable sociolects, which are being used by the Tuḷu speakers all over coastal Karnataka [karnāṭaka].

Therefore we do not decide which regional dialect and which sociolect is suppose to be standard. In spite of it we consider common Tuḷu sociolect of all the four regional dialects as the primary source of Data. This would be more acceptable to the Tuḷu native speakers. Acceptability and usage are the main parameters in providing synsets.

However, Bramhin Tuḷu and Jain Tuḷu of all the regional dialects will be given focus too. As far as Harijan and Dalit sociolect is considered whatever it is available through the written works only those words can be taken. It is also necessary to mention that for a given synset words from all the dialects should not be there; because, some words may be common to all dialects.

For example:

ID: 226 Hindi synset: sukr, sukr grah, sūk, vīnus, ṣoḍaśāṁṣu, śvētrath, sit

Tuḷu synset: bolli, sukra, sukre, sukra graho bolli (Common Tuḷu.)

sukra, sukre, sukra graho (Br.Tu & J. Tuḷu).

2.2.3 Technical issues

Tuḷu is not taught as a subject either in schools or in colleges. Moreover, it is not a scheduled language of India. There are attempts of pleading the Indian Government to consider Tuḷu under eighth-schedule. As a consequence the linguists who focused on Tuḷu were either foreign scholars or Tribal linguists (even though the Tuḷu is not a tribal language).

Therefore, for project personnel, it is inevitable to depend on the Tuḷu speakers who are having academic qualifications either in Kannada or Hindi. There is no dictionary for Hindi –Tuḷu and one has to depend on Hindi- Kannada Dictionary to find out lexical items for Tuḷu synsets.

The concept of synonymy, antonymy, hypernymy, hyponymy, meronymy, and

holonymy are not well exercised in the Tulu linguistic studies. As a result the developing WordNet for Tulu takes lot of exercise of the above mentioned theoretical notions independently throughout the project. However, to cope with the requirements of the project we need to train the project fellows with the theory of sense relations as practiced in the WordNet project, which may take six weeks of a program for the project personnel. We need to develop samples for each sense-relation with Tuḷu examples and to run the program like an actual six week course in Lexical semantics and sense-relation.

3 Conclusion

I conclude here that developing an electronic lexical resource for Tuḷu based on the theoretical and applied grounds of Princeton University English WordNet is quite promising and novel one for the revival of Tuḷu language. The technical support from IndoWordNet team is promising and helpful. However, developing Tuḷu WordNet definitely poses many challenges than what we initially presumed due to lack of resources and expert hands. This will be overcome when the project funding comes through.

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