Grammar and Mechanics Error Tool (GAMET)

Quick Start Guide and User Manual

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GAMET is based on which is based on the Java LanguageTool v3.2 and the Python library language-check (https://pypi.python.org/pypi/language-check). This document is intended to assist users of GAMET. It includes a brief explanation of how to get started with the tool and a description of how indices within the tool are calculated. If this is the first time using GAMET or similar tools found at www.linguisticanalysistools.org, it is advisable to read this entire document as well as the quick start guide for other tools (e.g., GAMET) which have sections on how to conduct studies with NLP tools. Additional information about GAMET is included in the supplementary Index Description Spreadsheet (available at www.linguisticanalysistools.org).

For now, please cite the following presentation when using TAACO in your work:

Crossley, S., Bustamante, A., & Bradfield, F. (September, 2018*). GAMET: A tool for automatically assessing grammar and mechanic errors in learner corpora*. Presented at the 14th American Association for Corpus Linguistics (AACL) Conference. Atlanta, GA.

Compatibility

GAMET works on Mac OSX and Windows. For MAC, operating system of Sierra or later are required.

Requirements

Please make sure you have the latest version of Java downloaded. In windows, you can run "java -version" in the Windows Command Prompt. In Mac you can search for the "Java Control Panel" in system preferences.

Input Text Formatting

GAMET is designed to process plain text (.txt) files with UTF-8 encoding. This is a very common encoding type, though not all word processing software will default to UTF-8 encoding. A common reason for GAMET to malfunction is text encoding. If problems occur during the use of GAMET, it is important to ensure that a) filenames only include "normal" English characters and b) texts are in UTF-8 format. If you change file formats (i.e., from .pdf or .doc to .txt), diligent cleaning of the converted formatting will be necessary.

Options

Index Options

GAMET reports on 286 "errors" as reported by LanguageTool v3.2. These errors have been categorized as duplication, grammar, misspelling, typographical, and white space errors. The user interface allows for the selection of specific error categories. See section below for accuracy of these errors on L1 and L2 writing samples. See the GAMET 1.0 Index Description Spreadsheet for further details.

Detailed Errors Output

GAMET provides diagnostic output designed to help users to understand how particular indices were calculated and to find examples of calculated errors. These data are provided if the user selects the out option "Include detailed errors." The data includes the context in which the error was flagged, the type of error flagged, suggestions for error correction, category of error, directory for file, and file name.

GAMET Features

GAMET automatically measures various lexical, mechanical, and structural errors in text using the Python library language-check (https://pypi.python.org/pypi/language-check). Specifically, using language-check 1.1, GAMET measures macro-errors in six broad categories: grammar, spelling, style, typography, whitespace and duplication errors. Additionally, GAMET measures micro-errors by reporting incidence counts of all errors reported in a text. For each error category, GAMET reports a raw total and a normed index by text length. In practice, the micro-error counts are rare and so the present study uses macro-error counts, which are described briefly below.

Duplication errors. GAMET measures word duplications as errors (e.g., *you have have to know where you are*).

Grammar errors. The grammar error index measures word and phrase level errors. It includes verb errors such as errors with verb usage, person, tense and aspect as well as noun errors like pluralization or determiner agreement. It also reports on adjective errors (including comparative and superlative errors), adverb errors (including adverb word order), connector errors (including the incorrect uses of coordinators and subordinators), negation errors, and fragment errors.

Spelling errors. The spelling error index measures deviations from conventional dictionary spellings of words. It also includes lowercase errors, missing hyphens, missing apostrophes in contractions, and inaccurate word spacing.

Style errors. Style errors reported by GAMET include features such as wordiness, redundancy, and word choice among others.

Typography errors. Typography errors include not capitalizing when necessary, missing commas and possessive apostrophes, and other punctuation errors.

White space errors. White space errors are calculated when inappropriate spacing, either an unneeded space such as one before a punctuation or an instance where a space was needed but not inserted are found.

Reliability

To test the accuracy of GAMET, we assessed the errors reported by the tool on two writing corpora. The first corpus consisted of independent essays samples collected from two administrations of the TOEFL-iBT. The essays were composed by two groups of 240 test-takers who were stratified by quartiles for each task (N =480). The essays were written on two different prompts (one prompt per form). The essays, the final scores, and the demographic information of the test-takers were directly provided by the Educational Testing Service (ETS). The 480 test-takers included both English as a Second Language (ESL) and English as a foreign language (EFL) learners. They were from a variety of home countries and linguistic backgrounds.

Our second corpus comprised 100 essays from an Java Control Panelon-line writing study conducted in the Writing Pal intelligent tutoring system (Crossley, Allen, & McNamara, 2016). The essays were written by public high school students in the metro Phoenix area. The students ranged in age from 14 to 19 and the majority of the students in the study were female (around 70%). About 60% of the students identified themselves as native speakers of English, with the remaining participants identifying themselves as non-native speakers of English. The essays were written on two prompts (on the value of competition and on the role of image/appearances).

Two expert raters were trained to classify all errors reported by GAMET in terms of accuracy and meaningfulness. In terms of accuracy, the raters examined each error and scored it on a three-point scale based on whether the classification was not accurate (1), potentially accurate (2), or accurate (3). In terms of meaningfulness, the raters were trained to identify whether the errors identified by GAMET would interfere with the processing of the text and, as a result, influence human ratings of writing quality. A similar three-point scale was used that identified errors that were not meaningful (1), potentially meaningful (2), or meaningful (3). Results for both corpora are reported below.

Table 2
Accuracy of errors identified by GAMET (TOEFL Essays)

Errors	Classification errors (%)	Accurate classifications (%)	Uncertain classifications (%)
Grammar	50 (0.08)	501 (0.799)	76 (0.121)
Misspellings	63 (0.015)	4048 (0.974)	43 (0.01)
Style	0 (0)	28 (0.283)	71 (0.717)
Typographical	18 (0.04)	424 (0.934)	12 (0.026)
Uncategorized	14 (0.043)	310 (0.945)	4 (0.012)
White space	3 (0.002)	1384 (0.996)	2 (0.001)
Duplication	0 (0)	35 (0.946)	2 (0.054)

Table 3
Meaningfulness of errors identified by GAMET (TOEFL Essays)

Errors	Not meaningful errors (%)	Meaningful errors (%)	Uncertain classifications (%)
Grammar	69 (0.11)	550 (0.877)	8 (0.013)
Misspellings	78 (0.019)	4070 (0.98)	6 (0.001)
Style	98 (0.99)	1 (0.01)	0 (0)
Typographical	23 (0.051)	428 (0.943)	3 (0.007)
Uncategorized	288 (0.878)	34 (0.104)	6 (0.018)
White space	3 (0.002)	1385 (0.997)	1 (0.001)
Duplication	0 (0)	36 (0.973)	1 (0.027)

Table 5
Accuracy of errors identified by GAMET (Writing Pal Essays)

Errors	Classification errors (%)	Accurate classifications (%)	Uncertain classifications (%)
Grammar	16 (0.25)	34 (0.531)	14 (0.219)
Misspellings	74 (0.106)	620 (0.887)	5 (0.007)
Style	19 (0.559)	15 (0.441)	0 (0)
Typographical	2 (0.057)	31 (0.886)	2 (0.057)
Uncategorized	2 (0.011)	185 (0.989)	0 (0)
White space	4 (0.5)	4 (0.5)	0 (0)
Duplication	0 (0)	9 (1)	0 (0)

Table 6
Meaningfulness of errors identified by GAMET (Writing Pal essays)

Errors	Not meaningful errors (%)	Meaningful errors (%)	Uncertain classification (%)
Grammar	19 (0.297)	45 (0.703)	0
Misspellings	83 (0.119)	616 (0.881)	0
Style	34 (1)	0 (0)	0
Typographical	2 (0.057)	33 (0.943)	0
Uncategorized	187 (1)	0 (0)	0
White space	4 (0.5)	4 (0.5)	0
Duplication	0 (0)	9 (1)	0