Paper Title\* (use style: paper title)

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*Abstract*—This electronic document is a “live” template and already defines the components of your paper [title, text, heads, etc.] in its style sheet. *\*CRITICAL: Do Not Use Symbols, Special Characters, Footnotes, or Math in Paper Title or Abstract*. (*Abstract*)

Keywords—component, formatting, style, styling, insert (key words)

# Introduction

In every software system after release, the maintenance phase continues, and it evolves constantly to provide the functionality needed and to incorporate new features. The needs of customers change. During the maintenance phase, regression testing is performed to find any bugs that might have been introduced. Testing is an important part of developing reliable software. Unfortunately, specifications are often neglected, and implementation is hindered by a range of factors such as incomplete planning, time constraints, limited automation, and undifferentiated costs. Test cases are a set of specific and detailed conditions needed for software testing. Test cases consist of three components: input parameters, execution conditions, and expected results. Generally, the requirements of a test suite (referred to as a set of at least one test case) evolve as the software is developed. Furthermore, test case selection can be defined as the process of selecting a subset of test cases within a domain based on predetermined criteria. Using them may optimize fault detection by eliminating redundant data and unnecessary testing, and by determining which testing strategy is most effective [1]. By applying two nature-inspired metaheuristic techniques to regression testing in this paper which is Particular Swarm Optimization and Firefly Algorithm in order to minimize the time spent on regression testing by selecting the test cases and comparing their performance.

Therefore, let's have more information about the Test Case and both algorithms.

* ***Test case selection*** is a method first introduced by Fischer in 1977 for software maintenance, it is based on specific and complete conditions called test cases, and is the process of raising the most relevant test cases for a change or update to SUT. As inputs to the testing process, test cases act as executional conditions with an expected outcome. In software, the number of test cases referred to as the test suite, increases with its evolution [2].
* ***Particle Swarm Optimization*** refers to an evolutionary computation method. In PSO, all particles are connected by their velocity. The particle velocities are adjusted dynamically in the search space based on their historical behavior. During the search process, the particles are therefore likely to fly toward the best search region.

In the PSO algorithm, three global variables are monitored:

* + The target value.
  + Global best (gBest) determines which particle's data is closest to that of the target.
  + Stopping value determines when the algorithm does not detect the Target so they should stop.

Each particle in the PSO algorithm includes:

* Data representing possible solutions
* A Velocity value, which indicates how much the data can be changed.
* Personal best (pBest) value, which means that the particle data is closest to the target [3].
* ***Firefly algorithm*** it is a novel method that was inspired by nature, and it's extensively utilized to solve the minimization problem. It can also efficiently prioritize the test cases created. The flash of fireflies attracts other fireflies in the vicinity. Flashes may be created by associating them with the objective function that has to be improved, allowing for the creation of novel optimization techniques. The Firefly algorithm is based on three assumptions.

* + All fireflies are monogamous. Every firefly attracts or is attracted to other fireflies in some way. Any firefly will be attracted to any other firefly, regardless of species.
* The brightness of the firefly has direct proportional to its appeal.
  + As fireflies are drawn to other available fireflies, the firefly's brightness becomes a priority among them when ranking attractiveness.
* If a more enticing firefly is not found in nearby regions, the fireflies will move randomly.
  + If there are two or more fireflies had the same brightness [4].

# Related work

## Selecting a Template (Heading 2)

First, confirm that you have the correct template for your paper size. This template has been tailored for output on the A4 paper size. If you are using US letter-sized paper, please close this file and download the Microsoft Word, Letter file.

## Maintaining the Integrity of the Specifications

The template is used to format your paper and style the text. All margins, column widths, line spaces, and text fonts are prescribed; please do not alter them. You may note peculiarities. For example, the head margin in this template measures proportionately more than is customary. This measurement and others are deliberate, using specifications that anticipate your paper as one part of the entire proceedings, and not as an independent document. Please do not revise any of the current designations.

# Prepare Your Paper Before Styling

Before you begin to format your paper, first write and save the content as a separate text file. Complete all content and organizational editing before formatting. Please note sections A-D below for more information on proofreading, spelling and grammar.

Keep your text and graphic files separate until after the text has been formatted and styled. Do not use hard tabs, and limit use of hard returns to only one return at the end of a paragraph. Do not add any kind of pagination anywhere in the paper. Do not number text heads-the template will do that for you.

## Abbreviations and Acronyms

Define abbreviations and acronyms the first time they are used in the text, even after they have been defined in the abstract. Abbreviations such as IEEE, SI, MKS, CGS, sc, dc, and rms do not have to be defined. Do not use abbreviations in the title or heads unless they are unavoidable.

## Units

* Use either SI (MKS) or CGS as primary units. (SI units are encouraged.) English units may be used as secondary units (in parentheses). An exception would be the use of English units as identifiers in trade, such as “3.5-inch disk drive”.
* Avoid combining SI and CGS units, such as current in amperes and magnetic field in oersteds. This often leads to confusion because equations do not balance dimensionally. If you must use mixed units, clearly state the units for each quantity that you use in an equation.
* Do not mix complete spellings and abbreviations of units: “Wb/m2” or “webers per square meter”, not “webers/m2”. Spell out units when they appear in text: “. . . a few henries”, not “. . . a few H”.

Identify applicable funding agency here. If none, delete this text box.

* Use a zero before decimal points: “0.25”, not “.25”. Use “cm3”, not “cc”. (*bullet list*)

## Equations

The equations are an exception to the prescribed specifications of this template. You will need to determine whether or not your equation should be typed using either the Times New Roman or the Symbol font (please no other font). To create multileveled equations, it may be necessary to treat the equation as a graphic and insert it into the text after your paper is styled.

Number equations consecutively. Equation numbers, within parentheses, are to position flush right, as in (1), using a right tab stop. To make your equations more compact, you may use the solidus ( / ), the exp function, or appropriate exponents. Italicize Roman symbols for quantities and variables, but not Greek symbols. Use a long dash rather than a hyphen for a minus sign. Punctuate equations with commas or periods when they are part of a sentence, as in:

*a**b* 

Note that the equation is centered using a center tab stop. Be sure that the symbols in your equation have been defined before or immediately following the equation. Use “(1)”, not “Eq. (1)” or “equation (1)”, except at the beginning of a sentence: “Equation (1) is . . .”

## Some Common Mistakes

* The word “data” is plural, not singular.
* The subscript for the permeability of vacuum **0, and other common scientific constants, is zero with subscript formatting, not a lowercase letter “o”.
* In American English, commas, semicolons, periods, question and exclamation marks are located within quotation marks only when a complete thought or name is cited, such as a title or full quotation. When quotation marks are used, instead of a bold or italic typeface, to highlight a word or phrase, punctuation should appear outside of the quotation marks. A parenthetical phrase or statement at the end of a sentence is punctuated outside of the closing parenthesis (like this). (A parenthetical sentence is punctuated within the parentheses.)
* A graph within a graph is an “inset”, not an “insert”. The word alternatively is preferred to the word “alternately” (unless you really mean something that alternates).
* Do not use the word “essentially” to mean “approximately” or “effectively”.
* In your paper title, if the words “that uses” can accurately replace the word “using”, capitalize the “u”; if not, keep using lower-cased.
* Be aware of the different meanings of the homophones “affect” and “effect”, “complement” and “compliment”, “discreet” and “discrete”, “principal” and “principle”.
* Do not confuse “imply” and “infer”.
* The prefix “non” is not a word; it should be joined to the word it modifies, usually without a hyphen.
* There is no period after the “et” in the Latin abbreviation “et al.”.
* The abbreviation “i.e.” means “that is”, and the abbreviation “e.g.” means “for example”.

An excellent style manual for science writers is [7].

# Using the Template

After the text edit has been completed, the paper is ready for the template. Duplicate the template file by using the Save As command, and use the naming convention prescribed by your conference for the name of your paper. In this newly created file, highlight all of the contents and import your prepared text file. You are now ready to style your paper; use the scroll down window on the left of the MS Word Formatting toolbar.

## Authors and Affiliations

**The template is designed for, but not limited to, six authors.** A minimum of one author is required for all conference articles. Author names should be listed starting from left to right and then moving down to the next line. This is the author sequence that will be used in future citations and by indexing services. Names should not be listed in columns nor group by affiliation. Please keep your affiliations as succinct as possible (for example, do not differentiate among departments of the same organization).

### For papers with more than six authors: Add author names horizontally, moving to a third row if needed for more than 8 authors.

### For papers with less than six authors: To change the default, adjust the template as follows.

#### Selection: Highlight all author and affiliation lines.

#### Change number of columns: Select the Columns icon from the MS Word Standard toolbar and then select the correct number of columns from the selection palette.

#### Deletion: Delete the author and affiliation lines for the extra authors.

## Identify the Headings

Headings, or heads, are organizational devices that guide the reader through your paper. There are two types: component heads and text heads.

Component heads identify the different components of your paper and are not topically subordinate to each other. Examples include Acknowledgments and References and, for these, the correct style to use is “Heading 5”. Use “figure caption” for your Figure captions, and “table head” for your table title. Run-in heads, such as “Abstract”, will require you to apply a style (in this case, italic) in addition to the style provided by the drop down menu to differentiate the head from the text.

Text heads organize the topics on a relational, hierarchical basis. For example, the paper title is the primary text head because all subsequent material relates and elaborates on this one topic. If there are two or more sub-topics, the next level head (uppercase Roman numerals) should be used and, conversely, if there are not at least two sub-topics, then no subheads should be introduced. Styles named “Heading 1”, “Heading 2”, “Heading 3”, and “Heading 4” are prescribed.

## Figures and Tables

#### Positioning Figures and Tables: Place figures and tables at the top and bottom of columns. Avoid placing them in the middle of columns. Large figures and tables may span across both columns. Figure captions should be below the figures; table heads should appear above the tables. Insert figures and tables after they are cited in the text. Use the abbreviation “Fig. 1”, even at the beginning of a sentence.

1. Table Type Styles

| Table Head | Table Column Head | | |
| --- | --- | --- | --- |
| Table column subhead | Subhead | Subhead |
| copy | More table copya |  |  |

1. Sample of a Table footnote. (*Table footnote*)
2. Example of a figure caption. (*figure caption*)

Figure Labels: Use 8 point Times New Roman for Figure labels. Use words rather than symbols or abbreviations when writing Figure axis labels to avoid confusing the reader. As an example, write the quantity “Magnetization”, or “Magnetization, M”, not just “M”. If including units in the label, present them within parentheses. Do not label axes only with units. In the example, write “Magnetization (A/m)” or “Magnetization {A[m(1)]}”, not just “A/m”. Do not label axes with a ratio of quantities and units. For example, write “Temperature (K)”, not “Temperature/K”.

##### Acknowledgment *(Heading 5)*

The preferred spelling of the word “acknowledgment” in America is without an “e” after the “g”. Avoid the stilted expression “one of us (R. B. G.) thanks ...”. Instead, try “R. B. G. thanks...”. Put sponsor acknowledgments in the unnumbered footnote on the first page.

##### References

The template will number citations consecutively within brackets [1]. The sentence punctuation follows the bracket [2]. Refer simply to the reference number, as in [3]—do not use “Ref. [3]” or “reference [3]” except at the beginning of a sentence: “Reference [3] was the first ...”

Number footnotes separately in superscripts. Place the actual footnote at the bottom of the column in which it was cited. Do not put footnotes in the abstract or reference list. Use letters for table footnotes.

Unless there are six authors or more give all authors’ names; do not use “et al.”. Papers that have not been published, even if they have been submitted for publication, should be cited as “unpublished” [4]. Papers that have been accepted for publication should be cited as “in press” [5]. Capitalize only the first word in a paper title, except for proper nouns and element symbols.

For papers published in translation journals, please give the English citation first, followed by the original foreign-language citation [6].

1. Narciso, E.N., Delamaro, M.E. and Nunes, F.D.L.D.S. (2014). Test Case Selection: A Systematic Literature Review. International Journal of Software Engineering and Knowledge Engineering, 24(04), pp.653–676.
2. Kazmi, R., Jawawi, D.N.A., Mohamad, R. and Ghani, I. (2017). Effective Regression Test Case Selection. *ACM Computing Surveys*, 50(2), pp.1–32.
3. R. Nagar, A. Kumar, S. Kumar and A. S. Baghel, "Implementing test case selection and reduction techniques using meta-heuristics," *2014 5th International Conference - Confluence The Next Generation Information Technology Summit (Confluence)*, 2014, pp. 837-842, doi: 10.1109/CONFLUENCE.2014.6949377.
4. M. Khatibsyarbini, M. A. Isa, D. N. A. Jawawi, H. N. A. Hamed and M. D. Mohamed Suffian, "Test Case Prioritization Using Firefly Algorithm for Software Testing," in *IEEE Access*, vol. 7, pp. 132360-132373, 2019, doi: 10.1109/ACCESS.2019.2940620.
5. R. Nicole, “Title of paper with only first word capitalized,” J. Name Stand. Abbrev., in press.
6. Y. Yorozu, M. Hirano, K. Oka, and Y. Tagawa, “Electron spectroscopy studies on magneto-optical media and plastic substrate interface,” IEEE Transl. J. Magn. Japan, vol. 2, pp. 740–741, August 1987 [Digests 9th Annual Conf. Magnetics Japan, p. 301, 1982].
7. M. Young, The Technical Writer’s Handbook. Mill Valley, CA: University Science, 1989.

**.**

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To have non-visible rules on your frame, use the MSWord “Format” pull-down menu, select Text Box > Colors and Lines to choose No Fill and No Line.