Preparing a paper and dealing with reviews: how to increase chances for your paper to be published

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These are some suggestions that may help the authors in paper preparation. It refers mainly to papers based on (mathematical, computer) modelling and optimization studies tested on a case study, but could be useful to the authors of other types of papers submitted to various journals as well.

PREPARING A PAPER

How to clearly and logically present your research results in the form of a scientific paper with an impact? You think the research you have carried is sound and it carries enough innovation, but how to convince others? A paper may have various forms, and researchers are free to express their ideas as they wish. However, it is often useful to follow generally accepted ideas of what text is seen to be logical, convincing and well written, and then chances that it is accepted by a renowned peer-reviewed journal are higher.

You are submitting a paper to a scientific journal, and it will be reviewed by researchers who know this subject quite well. Your paper have to present enough innovation, and present it clearly and convincingly. Typically they tend to reject papers presenting just another example of applying a known method to yet another typical case study. (If you do not see much of scientific innovation, but still think there are some new interesting elements in your work which can be useful for professionals, you may want to consider submitting a paper as a "technical note" or "experience paper" to a professional journal.)

A scientific paper typically follows the following logical structure:

- abstract (should briefly present motivation, objectives, novelty, and main finding(s));
- motivation for this work (introduction) (background; what is the problem? why it is important to solve it? what was already done before and why more research is needed?). This section is often called Introduction or Motivation;
- objectives (main objective, possibly with specific objectives);
- methodology (methods) with the justification of their use;
- description of the case study, with the specific problems associated with it, and data availability;
- experimental setup (details of data sets, parameterisation of models);
- results and discussion;
- conclusions: main findings, limitations, future outlook.

Titles could be a bit different (like Materials and Methods), and the order may vary (e.g. case study is sometimes presented in Introduction).

Motivation (Introduction) presents the background of this research work. Present the phenomenon or a system (physical, biological, socio-economical, etc.) you are researching, and the research problem which is to be solved. Explain why it is important to do this research (solve this problem), and if appropriate present a wider context of the problem, e.g. the social,

environmental and other aspects. Present the previous examples of addressing the problem, present a critical review of the known literature (stating what was positive and interesting, what were the conclusions, and what was not sufficiently researched in your opinion). Avoid presenting the known "text-book" material, descriptions of widely used models, etc. - provide references. Based on literature review, justify why more (your) research is needed.

Formulating the problem, try to highlight the starting point and to attribute it to one of the following classes: a) "case study first": to solve some problems related to the case study (which lead to introduction of new methods/models), or b) "method first": you developed an interesting method and want to test it on a case study. (Often however these two types are mixed.)

Based on the problem formulation, formulate the objective. It can be also detailed into several specific objectives, and/or research questions.

Clearly present what is the innovation of your study, how does it enrich science and/or technology. What is new in your research? Mention what is its practical value.

You may also provide a brief outline of the paper.

Methodology. Try to present a diagram or logical scheme of the main parts of methodology logically arranged. Describe the important methods used in this paper, so that a reader would understand the main principles without going to other literature sources. Explain what are the assumptions made about data, its accuracy and stationarity, and about the adequacy of the models used.

Logic of introducing (using) any (new) approach/method/model is this: 1) show the deficiencies of an existing method(s); 2) introduce the new one and justify its choice; 3) compare the new one to the old one(s) and demonstrate the advantages and limitations of the new one.

If you use a complex model A, explain why a simpler model B cannot be used, and/or in what sense the use of a more complex model would help. Example: if you suggest to use an ANN, show the deficiencies of a simpler model, e.g. of a linear regression model. If a linear model is good enough, there is not much use of developing a non-linear one.

Present the model performance indicators to be used for assessing models accuracy (comparing its output to observed data).

Modelling methodology typically includes: data analysis, data cleaning and infilling, sometimes data transformation, model calibration, analysis of model sensitivity and uncertainty to its parameters and inputs (and sometimes to model structure), interpretation of results. If for some reason you do not calibrate a model, or do not intent to apply formal methods for uncertainty analysis, explain why, and try to give some ideas of how it can be done.

If you are solving an optimization problem, this problem has to be presented mathematically, with the three explicit components: decision variables, constraints, and objectives functions. If you use randomised search methods (like evolutionary algorithms) explain, why (faster) gradient-based methods cannot be used.

Case study. Describe the case study, with the specific problems associated with it. For a hydrological or hydraulic case study, description of the physical system (e.g. catchment, or a river) and a map is often required. Describe what is data is available, how accurate is it.

Experimental setup. The details of your experiments, e.g. details of data sets, parameterisation of models, the used hardware, etc. is good to put in this separate section. Methodology is quite a general thing, and the details of experiment are specific for the considered case study or models tuning. This section does not present the results, but only the "setting the scene".

If a data-driven or statistical model is presented, the following is expected:

- Description of data, plots, etc. Try to answer the question: is the available data size and quality enough to build a reliable data-driven model?
- Explanation of how input variables are chosen. Typically correlation or mutual information analysis is used, or model-based methods (i.e. a set of variables is chosen ensuring the maximum performance on cross-validation set). Of course expert judgement is also one of the methods to use, but its validity and underlining reasoning has to be presented.
- Is there a match between the amount of data available and the number of parameters in a model to determine (model structure). For example, 30 examples is hardly enough to train a MLP ANN with 120 weights.
- Explanation on how data is split in 1) training set, 2) cross-validation set, 3) test set. (Sometimes there are only training and test sets).
- It is methodologically incorrect to use the test set (designed to imitate functioning of the model in operation) for tuning the model, or selecting the best model. Only training and cross-validation sets can be used for that.
- Presentation of the statistical properties of the data (if applicable): of the whole set, and of the mentioned sub-sets: min, max, mean, standard deviation, size.
- Explanation on how cross-validation is carried out? (ideally, try to apply n-fold cross validation). If cross-validation is not employed please explain why.

Sometimes the usefulness of a method (model) is demonstrated on a synthetic data set (because you can easily control its properties, noise in data, etc. to explore behaviour and performance of a model), and then it is done for a real-life case study.

Results and discussions. In this section the results are presented. Use tables and graphs to make it convincing. The experiments have to show e.g. that the method you propose, in comparison with the methods used in the past, is better or at least not inferior, based on some criteria: accuracy, speed, generality, ease of use, etc. It may happen that your model shows very similar results - in this case think of the scenarios of using it: it may be used for cross-comparison, or in ensemble with other methods, etc.

This section does end with presenting the results, e.g. plots comparing various methods. The results have to interpreted, you have to try to explain unexpected results which may contradict common sense. Try to link the results of computer model experiments with reality, the ways of communicating these results to practitioners and the use of these methods or models for other case studies. Discuss how strong were the assumptions you made (about data and models), and their influence on the results.

Discuss the results of model sensitivity and uncertainty analysis.

When comparing two methods of models A and B, under assumption of noisy data, please take into account the following. If the differences in their performance are small (several percent), be careful in making strong statements like “model A is better than model B”. These differences may disappear if you split data differently, or parameterise your model differently. It is better to use words like “slightly better, comparable, marginally better, or has similar performance”. If you know data is not very accurate (noisy), there is no sense of using too many significant digits in the presentation of errors.

Discuss how the method or model you present will be used in practice, what particular practical problems will it help to solve (if applicable), how to use this methods in other cases and contexts.

Present and discuss the limitations of your approach. Discuss scenarios when your approach may not work.

Conclusions and recommendations. In the section with conclusions the following can be mentioned. Remind readers what they have read, why it was significant and why this paper was worth reading and publishing. Main findings (good if they are numbered - this shows your structured thinking). An answer to the question: are objectives reached (could be even done for each specific objective). Limitations of the presented approach. Can the results be generalised? (or strong assumptions do not allow for that). How these results may change professional practice, what are the recommendations of using the presented methodology in other cases? Briefly explain what are the directions for further research (future outlook).

Sometimes it is useful to put the “take home message” or mention the “iconic figure” of your paper.

It is better to be modest in stating what you have achieved, and use words like “based on the two experiments, the presented combination of methods has certain advantages if compared to other methods applied earlier”, “it can be concluded that the presented model can help management practice in the given case study”, rather than “the model is superior”, “method A is better than method B”. (The latter can be indeed true - but only for the considered cases.)

Figures: Avoid excessive numbers of figures: select those figures that clearly support the presentation. Provide an explaining caption allowing the reader to understand the figure without reading the main text. Quality: are axes marked, are legends clear, and captions self-explanatory, are plots in black-and-white print clear? In the original submission embed figures within main text to avoid reviewers needing to move back and forth.

References: Have you provided the latest references? (A good check is to use Internet search engines to find papers with similar keywords.) Are they properly formatted? If you submit the paper to journal J, it would be reasonable to provide references to the papers in this particular journal. Please note that it is not very good taste to have too many references to your own papers. Do all citations in the text have a corresponding reference? Are all the references cited in the text?

Plagiarism. This is an important issue - there is enough material in Internet on this topic. If you are using ideas or material form another paper, always provide a citation. If you take more than seven words in a row, enclose them in quotation marks. Every figure or drawing has an author. If you want to present a figure from another source you may need a permission of the publisher. Please note that direct use of text or Figures from your own earlier publication is not allowed by a publisher. This may present problems if you want to use e.g. a figure with a model structure in several publications. (What some authors do is the following: they make figures and drawings for their research and put them on their web page; this material is considered to be public, cannot be copyrighted, and can be used in the papers submitted to journal by everybody including the author - of course with the corresponding reference.)

Style: please try to avoid repeating the same thing several times trying "to convince the reader". For each paragraph, try to answer the following questions: what exactly do I want to say here? is this absolutely clear for the reader who is seeing this paper for the first time? Avoid long sentences and making multiple statements in one sentence. Have one paragraph for each distinct topic. Try to provide a logical transition from one section (paragraph) to another to ensure a clear flow of thought, guiding the reader from one topic to another.

Check if you have more than one sub-sections in every section (or none). If a section has several sub-sections, ensure that every considerable part of text has a title and constitutes a sub-section.

Be consistent with time used: if you started e.g. to use Present Indefinite Tense ("our experiments show") (this is perhaps the best choice), use it across the paper and don't switch to Past Indefinite ("our experiments showed") or Present Perfect ("our experiments have shown"). If you present earlier results of other researchers, the use of Present Perfect Tense is perhaps the most appropriate ("authors have shown").

English: is it of the level that you see in the published papers? Try to polish English as much as possible before submission. Try to go through every sentence and check if it has sense and is **clearly formulated** (help from a colleague could be a thing to consider).

What reviewers to recommend? Usually the authors are asked to give names of several potential reviewers. Please try ensure that they are independent, not from you Institution, come from several countries, and you may want even to think of various nationalities. Try not to recommend close personal friends since you may be putting them in a difficult position. If you are providing a reviewer's name, and his/her papers are not cited in your paper, please think what expertise you assume this reviewer does have that you are recommending this person. Please do not recommend reviewers who approve anything - you will miss the chance to improve the paper, the editor will have to search for the new reviewers, and this will delay publication. Try to think of reviewers as people who are experts, may give a critical view at your paper, point at possible problems, give recommendations, and by this may help to improve it before publication.

WHAT THE REVIEWERS ARE LOOKING AT: A CHECKLIST

Before submission, try to put yourself into the shoes of a reviewer, and think what a reviewer would be analysing in your paper. Read the paper as if you are a reviewer.

When evaluating your paper, the reviewers will typically try to answer the following questions.

Is the work understandable, and appropriate for the journal?
- Is the purpose or goal of the work within the journal's scope?
- What are the problems to solve in the paper? Are they clearly stated?
- Are the techniques employed appropriate? Is the mathematics correct?

Is the work original and interesting?
- Does this work contain new results that significantly advance the research field?
- Have any parts of the paper already been published or considered for other publication?

Is this paper likely to be cited in the future?
- Is the paper scientifically sound? Does it provide sufficient information and in-depth discussion?
- Are the results clearly and convincingly presented? Can they be reproduced?

Is the presentation logical and clear?
- Does the work follow a traditional logical structure: "motivation - problem statement - objectives - methodology - results and discussion - conclusions - future outlook"?
- Is it enough to read the abstract and understand the main objectives and findings?
- Does the introductory section adequately explain the problems to be solved by this research? Are the importance and usefulness of this research work clear?
- Is the case study, and the problems associated with it, clearly presented?
- Is the conclusion logically supported by the obtained results?
- Are the limitations of the presented approach discussed?
- Is the paper clearly written?
- Does the title reflect the contents of the paper?
- Are sufficient references cited for providing a background to the research?
- Is the length and format of the paper appropriate?
- Are the figures and tables easily readable, correct and informative?
- Is the English understandable? Is the paper free of typographical and grammatical errors?

HOW TO DEAL WITH THE REVIEWERS' COMMENTS?

It may happen that your paper is not immediately accepted, and the Editor recommends revision. Read the reviewers' comments, and take a deep sigh. You may be asked to do more experiments, and usually you will have to spend quite a lot of time on writing the reply (sometimes called a rebuttal) to reviewers' or editor's comments. If a rebuttal is well-written, it will help to establish a good positive communication with the editor and reviewers.

In almost all cases reviewers want to help improve the paper. Do not take comments personal, even if sometimes you may not like the way comments are expressed. Note that for the most reviewers English is not the mother tongue and they are busy people.

Please provide answers to every comment. Try to be clear, convincing, and at the same time brief. Please provide citations from the revised manuscript in the reply, so that the reviewer

could see what is changed. It is is also useful to indicate with colour, what is changed in the revised manuscript (or using Track Changes in MS-Word).

Sometimes reviewers pose questions instead of stating what should be changed. It means that perhaps you were not very clear in your manuscript. When you are writing a reply to a reviewer's question, please understand the reader will not see this reply and your explanations. Typically, if such reply is needed, it means that the manuscript should be revised accordingly as well.

Admit your errors, and explain why you have made them. However you may not agree to some comments. In this case, explain with what you do agree, and with what you do not, and why. Sometimes reviewers ask to do more work. It can be a justified suggestion, but you also may think that the paper is already too long, and have enough to present. In this case, if you think you have a strong point, give your reasons why you think it would not be reasonable to implement the reviewer's suggestion.

It may happen that two reviewers recommend contradicting things. Either find a compromise, or choose which way to go. In any case, explain, why you do not follow a particular reviewer's suggestion, mentioning that you have conflicting suggestions, and why have you chosen one of them against the other.

It may sometimes happen that a reviewer is not as knowledgeable on the subject of the manuscript as the author. Some papers may be so innovative that may be rejected simply because reviewers would not appreciate the results. Nonetheless, reviewer comments could be useful, even if they are wrong. Try to be patient, appreciate what the reviewer is saying, try to understand his/her reasoning, and explain clearer in your rebuttal why do you think your results are correct.

It may happen that a reviewer's comment is very brief, unsubstantiated and does not provide enough information. In this case you may write to the associate editor to request another review.

Some reviewers may ask to include references to papers which may not be necessarily relevant. Or they recommend to include more (or less) figures, or extend particular parts. You may find certain comments and requests unreasonable. Take them into account, but it is your decision to what extent to change the manuscript. If you are reluctant to follow some suggestions, be polite and provide a clear and justified explanation why. You are the author, not the reviewers.

Many critical reviewers' comments result from poor writing that leads to a reviewer's misunderstanding. In your reply, admit you were not clear, explain the possible misunderstanding, and show how the manuscript is updated.

Before submitting the revised manuscript, imagine you are a novice reader, and read it slowly again. Is it now clear, logical and convincing? It may be also useful to read yet another time what is written above in this document, and to try to check if you did everything possible to ensure the revised manuscript will be accepted.

Good luck!