Submission and Formatting Instructions for International Conference on Machine Learning (ICML 2019)

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Abstract

This document an overview of image extrapolation and re.

1. Image Inpainting

Image is one of the most common forms of information that is used in every domain of life. Image inpainting is the process of completing or recovering the missing region in the image or removing some object added to it. So, the operation of inpainting depends on the type or domain of applications. This section is a brief review of the existing image inpainting approaches. And most of the existing approaches can be classified into three categories, namely sequential-based, CNN-based and GAN-based methods. A list of the collected datasets is discussed because there is a lack of datasets available for image inpainting.

The operation of inpainting depends on the type or domain of applications as shown in Fig. 1. In image resotoration, we talk about removing the scratch or text that can be found in the images. In photo-editing application, we are interested in object removal (Muddala et al., 2016). And in image coding and transmission applications, the operation related to images inpainting is recovering the mission blocks. Besides, for virtual paintings' restoration, the related operation is crack removal. To handle this, many methods has been proposed including sequential algorithms or deep learning techniques.

1.1. Sequential-based approaches

The approached related to image inpainting can classified into two categories: patch-based and diffusion-based methods.

Patch-based methods are based on techniques to fill in the missing region patch-by-patch by searching for well-matching replacement patches (i.e., candidate patches) in the undamaged part of the image and copying them to corresponding locations. Many methods have been proposed for image inpainting using patch-based method.

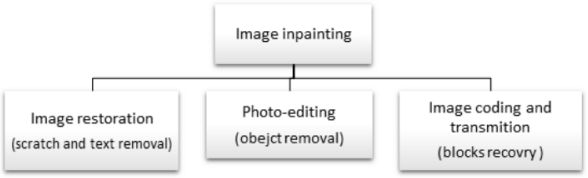

Figure 1. Image inpainting application and different existing types.

Ružić and Pižurica (Ružić & Pižurica, 2014) proposed a patch-based method consisting of searching the well-matched patch in the texture component using Markov Random Field (MRF).

Jin and Ye (Jin & Ye, 2015) proposed a patch-based approach based on annihilation property filter and low rank structured matrix.

In order to remove object from an image, Kawai *et al.* (Kawai et al., 2015) proposed an approach based on selecting the target object and limiting the search around the target by the background around.

Besides, using Two-Stage Low Rank Approximation (TSLRA) (Guo et al., 2017) and gradient-based low rank approximation (Lu et al., 2018), authors proposed patch-based methods for recovering the corrupted block in the image.

On RGB-D images full of noise and text, Xue *et al.* (Xue et al., 2017) proposed a depth image inpainting method based on Low Gradient Regularization.

Liu *et al.* (Liu et al., 2018) use the statistical regularization and similarity between regions to extract dominant linear structures of target regions followed by repairing of the missing regions using Markov random field model (MRF).

Ding *et al.* (Ding et al., 2018) proposed a patch-based

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method for image inpainting using Non-local Texture Matching and Nonlinear Filtering (Alpha-trimmed mean filter).

Duan *et al.* (Duan et al., 2015) proposed an image inpainting approach based on non-local MumfordShah model (NL-MS).

Fan and Zhang (Fan & Zhang, 2018) proposed another image inpainting method based on measuring the similarity between patches using Sum of Squared Differences (SSD).

In order to remove blocks from an image, Jiang (Jiang, 2016) proposed a method for image compression.

Using Singular value decomposition and an approximation matrix, Alilou and Yaghmaee (Alilou & Yaghmaee, 2017) proposed an approach to reconstruct the missing regions.

Other notable research includes using texture analysis on Thangka images to recover missing block in an image (Wang & Jia, 2017), and using the structure information of images (Wei & Liu, 2016; Yao, 2019).

In the same context, Zeng *et al.* (Zeng et al., 2019) proposed the use of Saliency Map and Gray entropy.

Zhang *et al.* (Zhang et al., 2018) proposed an image inpainting method using joint probability density matrix (JPDM) for object removal from images (Lin et al., 2019).

1.2. Diffusion-based methods

Diffusion-based methods fill in the missing region (the hole) by smoothly propagating image content from the boundary to the interior of the missing region.

Li *et al.*(Li et al., 2017) proposed a diffusion-based method for image inpainting by localizing the diffusion of inpainted regions following by a construction of a feature set based on the intra-channel and inter-channel local variances of the changes to identify the inpainted regions.

Another diffusion-based method of image inpainting proposed by the same authors in a later research (Li et al., 2016) involves exploiting diffusion coefficients which are computed using the distance and direction between the damaged pixel and its neighborhood pixel.

Sridevi *et al.* (Sridevi & Kumar, 2019) proposed another diffusion-based image inpainting method based on Fractional-order derivative and Fourier transform.

1.3. Other traditional methods

Jin*et al.* (Jin et al., 2018) proposed an approach called sparsity-based image inpainting detection based on canonical correlation analysis (CCA).

Mo and Zhou (Mo & Zhou, 2018) present a research based on dictionary learning using sparse representation. These methods are robust for simple images, but when the image is complex like contains a lot of texture and object or the object cover a large region in the images, searching for similar patch can be difficult.

2. Electronic Submission

Submission to ICML 2019 will be entirely electronic, via a web site (not email). Information about the submission process and LaTeX templates are available on the conference web site at:

`http://icml.cc/`

The guidelines below will be enforced for initial submissions and camera-ready copies. Here is a brief summary:

- Submissions must be in PDF.
- Submitted papers can be up to eight pages long, not including references, and up to twelve pages when references and acknowledgments are included. Any paper exceeding this length will automatically be rejected.
- **Do not include author information or acknowledgements** in your initial submission.
- Your paper should be in **10 point Times font**.
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- Keep your abstract brief and self-contained, one paragraph and roughly 4–6 sentences. Gross violations will require correction at the camera-ready phase. The title should have content words capitalized.

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```
dvips -Ppdf -tletter -G0 -o paper.ps paper.dvi
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```

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Graphics files should be a reasonable size, and included from an appropriate format. Use vector formats (.eps/.pdf) for plots, lossless bitmap formats (.png) for raster graphics with sharp lines, and jpeg for photo-like images.

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The final versions of papers accepted for publication should follow the same format and naming convention as initial submissions, except that author information (names and affiliations) should be given. See Section 3.3.2 for formatting instructions.

The footnote, "Preliminary work. Under review by the International Conference on Machine Learning (ICML). Do not distribute." must be modified to "*Proceedings of the 36^{th} International Conference on Machine Learning*, Long Beach, USA, 2019. Copyright 2019 by the author(s)."

For those using the **LaTeX** style file, this change (and others) is handled automatically by simply changing `\usepackage{icml2019}` to

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3.1. Length and Dimensions

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The text of the paper should be formatted in two columns, with an overall width of 6.75 inches, height of 9.0 inches, and 0.25 inches between the columns. The left margin should be 0.75 inches and the top margin 1.0 inch (2.54 cm). The right and bottom margins will depend on whether you print on US letter or A4 paper, but all final versions must be produced for US letter size.

The paper body should be set in 10 point type with a vertical spacing of 11 points. Please use Times typeface

throughout the text.

3.2. Title

The paper title should be set in 14 point bold type and centered between two horizontal rules that are 1 point thick, with 1.0 inch between the top rule and the top edge of the page. Capitalize the first letter of content words and put the rest of the title in lower case.

3.3. Author Information for Submission

ICML uses double-blind review, so author information must not appear. If you are using LaTeX and the `icml2019.sty` file, use `\icmlauthor{...}` to specify authors and `\icmlaffiliation{...}` to specify affiliations. (Read the TeX code used to produce this document for an example usage.) The author information will not be printed unless `accepted` is passed as an argument to the style file. Submissions that include the author information will not be reviewed.

3.3.1. Self-Citations

If you are citing published papers for which you are an author, refer to yourself in the third person. In particular, do not use phrases that reveal your identity (e.g., "in previous work (**?**), we have shown ...").

Do not anonymize citations in the reference section. The only exception are manuscripts that are not yet published (e.g., under submission). If you choose to refer to such unpublished manuscripts (**?**), anonymized copies have to be submitted as Supplementary Material via CMT. However, keep in mind that an ICML paper should be self contained and should contain sufficient detail for the reviewers to evaluate the work. In particular, reviewers are not required to look at the Supplementary Material when writing their review.

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If a paper is accepted, a final camera-ready copy must be prepared. For camera-ready papers, author information should start 0.3 inches below the bottom rule surrounding the title. The authors' names should appear in 10 point bold type, in a row, separated by white space, and centered. Author names should not be broken across lines. Unbolded superscripted numbers, starting 1, should be used to refer to affiliations.

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The paper abstract should begin in the left column, 0.4 inches below the final address. The heading 'Abstract' should be centered, bold, and in 11 point type. The abstract body should use 10 point type, with a vertical spacing of 11 points, and should be indented 0.25 inches more than normal on left-hand and right-hand margins. Insert 0.4 inches of blank space after the body. Keep your abstract brief and self-contained, limiting it to one paragraph and roughly 4–6 sentences. Gross violations will require correction at the camera-ready phase.

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3.5.1. Sections and Subsections

Section headings should be numbered, flush left, and set in 11 pt bold type with the content words capitalized. Leave 0.25 inches of space before the heading and 0.15 inches after the heading.

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Please use no more than three levels of headings.

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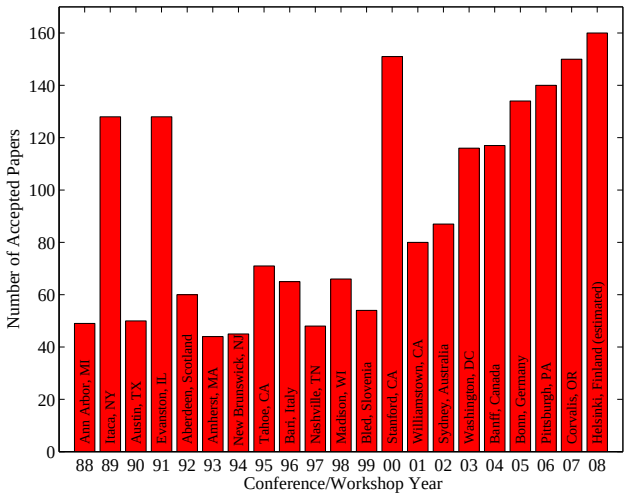

Figure 2. Historical locations and number of accepted papers for International Machine Learning Conferences (ICML 1993 – ICML 2008) and International Workshops on Machine Learning (ML 1988 – ML 1992). At the time this figure was produced, the number of accepted papers for ICML 2008 was unknown and instead estimated.

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You may want to include figures in the paper to illustrate your approach and results. Such artwork should be centered, legible, and separated from the text. Lines should be dark and at least 0.5 points thick for purposes of reproduction, and text should not appear on a gray background.

Label all distinct components of each figure. If the figure takes the form of a graph, then give a name for each axis and include a legend that briefly describes each curve. Do not include a title inside the figure; instead, the caption should serve this function.

[1]Footnotes should be complete sentences.

[2]Multiple footnotes can appear in each column, in the same order as they appear in the text, but spread them across columns and pages if possible.

Algorithm 1 Bubble Sort

Input: data x_i, size m
repeat
  Initialize $noChange = true$.
  for $i = 1$ **to** $m - 1$ **do**
    if $x_i > x_{i+1}$ **then**
      Swap x_i and x_{i+1}
      $noChange = false$
    end if
  end for
until $noChange$ is $true$

Number figures sequentially, placing the figure number and caption *after* the graphics, with at least 0.1 inches of space before the caption and 0.1 inches after it, as in Figure 2. The figure caption should be set in 9 point type and centered unless it runs two or more lines, in which case it should be flush left. You may float figures to the top or bottom of a column, and you may set wide figures across both columns (use the environment `figure*` in LaTeX). Always place two-column figures at the top or bottom of the page.

3.7. Algorithms

If you are using LaTeX, please use the "algorithm" and "algorithmic" environments to format pseudocode. These require the corresponding stylefiles, algorithm.sty and algorithmic.sty, which are supplied with this package. Algorithm 1 shows an example.

3.8. Tables

You may also want to include tables that summarize material. Like figures, these should be centered, legible, and numbered consecutively. However, place the title *above* the table with at least 0.1 inches of space before the title and the same after it, as in Table 1. The table title should be set in 9 point type and centered unless it runs two or more lines, in which case it should be flush left.

Tables contain textual material, whereas figures contain graphical material. Specify the contents of each row and column in the table's topmost row. Again, you may float tables to a column's top or bottom, and set wide tables across both columns. Place two-column tables at the top or bottom of the page.

3.9. Citations and References

Please use APA reference format regardless of your formatter or word processor. If you rely on the LaTeX bibliographic facility, use `natbib.sty` and `icml2019.bst`

Table 1. Classification accuracies for naive Bayes and flexible Bayes on various data sets.

DATA SET	NAIVE	FLEXIBLE	BETTER?
BREAST	95.9± 0.2	96.7± 0.2	√
CLEVELAND	83.3± 0.6	80.0± 0.6	×
GLASS2	61.9± 1.4	83.8± 0.7	√
CREDIT	74.8± 0.5	78.3± 0.6	
HORSE	73.3± 0.9	69.7± 1.0	×
META	67.1± 0.6	76.5± 0.5	√
PIMA	75.1± 0.6	73.9± 0.5	
VEHICLE	44.9± 0.6	61.5± 0.4	√

included in the style-file package to obtain this format.

Citations within the text should include the authors' last names and year. If the authors' names are included in the sentence, place only the year in parentheses, for example when referencing Arthur Samuel's pioneering work (**?**). Otherwise place the entire reference in parentheses with the authors and year separated by a comma (**?**). List multiple references separated by semicolons (**???**). Use the 'et al.' construct only for citations with three or more authors or after listing all authors to a publication in an earlier reference (**?**).

Authors should cite their own work in the third person in the initial version of their paper submitted for blind review. Please refer to Section 3.3 for detailed instructions on how to cite your own papers.

Use an unnumbered first-level section heading for the references, and use a hanging indent style, with the first line of the reference flush against the left margin and subsequent lines indented by 10 points. The references at the end of this document give examples for journal articles (**?**), conference publications (**?**), book chapters (**?**), books (**?**), edited volumes (**?**), technical reports (**?**), and dissertations (**?**).

Alphabetize references by the surnames of the first authors, with single author entries preceding multiple author entries. Order references for the same authors by year of publication, with the earliest first. Make sure that each reference includes all relevant information (e.g., page numbers).

Please put some effort into making references complete, presentable, and consistent. If using bibtex, please protect capital letters of names and abbreviations in titles, for example, use {B}ayesian or {L}ipschitz in your .bib file.

3.10. Software and Data

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Acknowledgements

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If a paper is accepted, the final camera-ready version can (and probably should) include acknowledgements. In this case, please place such acknowledgements in an unnumbered section at the end of the paper. Typically, this will include thanks to reviewers who gave useful comments, to colleagues who contributed to the ideas, and to funding agencies and corporate sponsors that provided financial support.

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