

Writing Guide

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1 Sentence

⊙ Use concrete words

Use concrete words with specific meaning instead of general words with vague meaning.

Bad example:

Texture provides an important cue for retrieving images from a database. Due to differences in viewing angles, texture patterns in different part of an image may vary in scale and orientation.

Comment:

Actually, this is not so bad. The only problem is that it is unclear what it means by an “important cue” and the 2nd sentence doesn’t explain it.

Better example:

Texture provides a useful cue for retrieving images from a database. Due to ...

Comment:

See the difference? The word “important” begs the question “how important?” The word “useful” is more specific about importance.

⊙ Use active speech

Use active speech, avoid passive speech. Use verb clause, avoid noun clause.

Bad example:

A multi-channel approach is adopted for extraction of texture features.

Comment:

The clause “is adopted...” is in passive speech. The clause “for extraction of...” is a noun clause.

Better example:

A multi-channel approach is adopted for extracting texture features.

Better still:

The proposed method adopts a multi-channel approach for extracting texture features.

⊙ **Use pronoun correctly**

Make sure the referent of pronoun (“it”, “they”, etc.) is not ambiguous or misleading.

Bad example:

Search engines want to support their users in retrieving images that correspond to what they are looking for.

Comment:

The referent of “they” is ambiguous. Is it referring to the search engines or the users? The first “their” obviously refers to the search engines. But, the second “they” seems to refer to the users. If so, the referent of “their” is different from that of “they”, which is inconsistent and confusing.

Better example:

Ideally, search engines should allow the users to retrieve images that meet the users’ need.

⊙ **Use comparatives correctly**

Comparative adjectives are used to compare two things. Correct use of comparative adjectives should include “than” and the two things that are being compared.

Bad example:

Algorithm 2 is better because it is more efficient.

Comment:

Incomplete sentence: Better than what? More efficient than what?

Better example:

Algorithm 2 is more efficient than Algorithm 3.

⊙ **Compare comparable things**

The two things that are compared must be comparable. Do not compare apples with oranges.

Bad example:

With strategies 1 and 2, the solutions are similar but they are less viable than strategy 3.

Comment:

“They” refer to “the solutions”. It cannot be compared with “strategy 3”, which is not a solution.

Better example:

With strategies 1 and 2, the solutions are similar but they are less viable than the solution of strategy 3.

Or

With strategies 1 and 2, the solutions are similar but they are less viable than that of strategy 3.

Bad example:

Algorithm 1 is more likely to obtain an accurate result than Algorithm 2.

Comment:

“Result” cannot be compared with “algorithm”.

Better example:

Algorithm 1 is more likely to obtain an accurate result than does algorithm 2.

⊙ Use words correctly

Use the correct words. Check a dictionary when you are unsure of the meaning of the words.

Bad example:

Texture is a common phenomenon in the natural scenery such as sea waves, fabrics, furs, grassland, pebbles, wood, and foods.

Comment:

Fabrics, furs, pebbles, wood, and foods are not scenery.

Better example:

Texture is a common feature in natural scenery such as sea waves, mountain ranges, grasslands, and clouded skys.

Better example:

Texture is a common feature in natural objects such as fabrics, furs, pebbles, wood, and foods.

Bad example:

The image regions contain different object types.

Comment:

An image region does not contain object types. It contains objects.

Better example:

The image regions contain different types of objects.

⊙ **Avoid repeated words**

Avoid using the same word several times in a sentence. Avoid using the same word to end a sentence and then begin the next sentence.

Bad example:

While existing works use non-overlapping filters, the filters used here are chosen such that there are some overlaps in the filters' half-peak supports.

Comment:

The word “filter” is used three times in a sentence. It ends the first clause and begins the next clause.

Better example:

Existing works use filters with no overlap in their half-peak supports. On the other hand, filters with overlapping supports are used here.

⊙ **Avoid repeated use of “is”**

Avoid using “is” repeatedly in multiple sentences, which makes the sentences dry.

Bad example:

A note is the fundamental unit of a music score. A chord is a set of notes played simultaneously or consecutively. A melody is ...

Comment:

Repeated use of “is” makes the sentences dry and uninteresting.

Better example:

A note is the fundamental unit of a music score. Notes can be stacked together to form a chord. ...

⊙ **Avoid using “is” as verb**

Sentences that use “is” and “are” as verbs are weak. Use stronger verbs.

Bad example:

For the first criterion, there are multiple sites that satisfy this criterion.

Comment:

The main verb of this sentence is “are”, which is a weak verb.

Better example:

For the first criterion, multiple sites satisfy this criterion.

Better still:

Multiple sites satisfy the first criterion.

Comment:

In this version, the word “criterion” is used only once.

⊙ **Avoid using “we”**

Avoid using “I”, “we”, “our”, etc. Most of the time, the usage is either incorrect or awkward.

Bad example:

We smooth the image to reduce noise. Then, we extract edges from the image.

Comment:

These sentences mean that “you, the researcher, execute the tasks manually by yourself.” But, the tasks are not executed by you; they are executed by programs that you write!

Better example:

The algorithm first smooths the image to reduce noise. Then, it extracts edges from the image.

Bad example:

First, we select training and testing images from the image database. Then, we train a classifier to classify the training images. Then, we test the classifier on the testing images.

Comment:

This use of “we” is correct. But, too many “we” make the sentence awkward to read. Likewise, too many “then” make the sentence awkward too.

Better example:

Training and testing images are selected from the image database. Then, we train the classifier with the training images, and test it on the testing images.

⊙ **Avoid useless sentences**

Avoid writing general sentences that contain little or no information.

Bad example:

Texture segmentation plays an important role in nature scenery analysis. This paper present a segmentation approach...

Comment:

The first sentence says that texture segmentation plays an important role but does not say what kind of important role it plays.

Better example:

Texture segmentation plays an important role in the analysis of natural scenes. It divides the scene image into regions of uniform textures, each of which corresponds to the surface of a distinct object.

⊙ **Aoidv vague sentences**

Avoid writing vague sentences with many buzzwords.

Bad example:

Texture is one of the most significant clues for image segmentation, scene analysis and object recognition. It is also an important reference for content-based image retrieval of large image database.

Comment:

These sentences are too vague and contain too many buzzwords. What are “significant clues” and “important reference”? How important are they? How are they use? These sentences contain many nouns but only one verb “is”, which is repeated twice.

Better example:

Texture can be used to aid in the analysis of natural images. It can also serve as a search key for retrieving images from large databases.

⊙ **Explain concepts clearly**

Never explain a technical term using other technical terms. Such sentences cannot explain anything. Always explain a technical term using non-technical terms that are easy for the readers to understand.

Bad example:

Coarseness, contrast, and directionality are statistical measures of the pixel values that reflect their attribute names.

Comment:

This sentence doesn't explain anything.

Better example:

Coarseness measures the apparent grain size of the texture. Contrast measures the difference between the bright and dark parts of the texture. Directionality measures...

Bad example:

In natural textured images, frequency and orientation content within a texture varies gradually, thus overlapping of filters ensures that the Gabor outputs change smoothly with the gradual variation of frequency and orientation.

Comment:

The clause before “thus” is supposed to explain the clause after it: “Because of A, thus B”. In these sentences, why A causes B is unexplained.

Better example:

The texture feature extraction method uses overlapping filters to minimize the variation of feature pattern due to changes in texture frequency and orientation.

Comment:

The revised sentence avoids having to explain why A causes B.

⊙ **Avoid forward referencing**

Do not refer to a technical term or an acronym before you explain it.

Bad example:

In theory, there is an infinite number of points within ME and it is computationally impossible to include all of them. ... Therefore, the mesh vertices within medial epicondyle (ME) are used as the candidates of femoral attachment sites ...

Comment:

The acronym ME is used before it is explained.

Better example:

In theory, there is an infinite number of points within medial epicondyle (ME) and it is computationally impossible to include all of them. ... Therefore, the mesh vertices within ME are used as the candidates of femoral attachment sites ...

⊙ **Use simple sentence constructs**

Avoid complex sentence constructs. Avoid writing long sentences because they tend to be too complex.

Bad example:

For possible femoral attachment sites, the vertices of the femur mesh model that lie within the medial epicondyle (ME) were used as the mesh is sufficiently dense to describe the complex bone surface (Fig. 2).

Comment:

This sentence is too long and too complex. It talks about too many things. Break it into shorter and simpler sentences.

Better example:

The mesh points within the medial epicondyle (ME) region were considered as candidate sites. In theory, there is an infinite number of points in this region, and it is impossible for an algorithm to work with an infinite set of points. Instead, a finite set of points suffices as long as the set is densely sampled from the mesh surface. ...

2 Paragraph

⊙ **Bad Paragraph**

Do not write a paragraph with only one sentence.

⊙ **Lead Sentence**

The first sentence of a paragraph, the lead sentence, should highlight the content of the paragraph. It should be short and sharp.

Bad example:

Although melody can be extracted from the target music easily, it is difficult to determine the degree to which reference harmony can be maximally extracted for recombination with the target melody. This is because music harmony is made up of simultaneous sounding tones that can progress at different rates. Also, it is difficult to automatically determine whether the harmonic interactions between melody and accompaniment are musically pleasing or not. ...

Comment:

The lead sentence of this paragraph is too complex, and it does not highlight the content of the paragraph.

Better example:

Combining the reference harmony to the target melody is a challenging task. ...

⊙ **One topic per paragraph**

A paragraph should discuss just one topic. All the sentences in the paragraph should discuss the same topic.

Bad example:

As the biggest bearing joints in human body, knee joint has a complex anatomical structure. The highlight of anatomical structure of knee joint is shown in Figure 1. The knee is made up primarily of two joints and soft tissues. ... include ...

Comment:

Each sentence of this paragraph talks about a different topic. The first sentence talks about knee joint having complex structure. The second sentence talks about highlight of anatomical structure. The third sentence talks about the knee having joints and soft tissues. This difference is apparent in the change of subject from sentence to sentence. Refer to the next guideline on the use of consistent subject.

Better example:

Knee joint is the largest joint in the human body. This joint supports the whole body weight and allows a complex set of movements such as walking, jumping and running. ...

Comment:

In this revised paragraph, both sentences talk about the knee joint. Moreover, the subjects of these sentences are the same: the knee joint.

⊙ Use consistent subject

The subject of a sentence is the person, place, thing, or idea that is doing or being something. Constant switching of subject results in a poorly connected paragraph that confuses the readers. Consecutive sentences in a paragraph should refer to the same subject.

Bad example:

Canny edge detector is applied on the image to extract edges. Then, an edge following algorithm is used to connect the edges into long curves. Then, the object's boundary contour is obtained by connecting the long curves.

Comment

The subjects of the three sentences are different, namely "Canny edge detector", "edge following algorithm", and "object's boundary contour". These sentences don't connect well.

Better example:

An object's boundary contour is extracted as follows. First, edges are extracted from the image by applying Canny edge detector. Then, the edges are connected into long curves using an edge following algorithm. Finally, the long curves are connected to form the object's boundary contour.

Comment

In the revised sentences, the subjects are more consistent. All of them refer to the boundary contour or parts of it, such as edges and long curves.

⊙ Connect sentences properly

Every sentence must follow from the immediately preceding sentence and lead to the immediately following sentence.

Bad example:

The first step in texture segmentation is to extract texture features. There are three general classes of texture features: Markov random field, Fourier transform amplitudes, and Gabor filter amplitudes.

Comment:

The first sentence is about an operation: texture segmentation. The second sentence is about three things: three general classes of texture features. The second sentence doesn't follow from the first because they are talking about different things.

Better example:

Texture features are important for texture segmentation of images. There are three general classes of texture features: Markov random field, Fourier transform amplitudes, and Gabor filter amplitudes.

Bad example:

The knee joint supports the whole body weight and allows a complex set of movements. It is made up of several bones and soft tissues.

Comment:

The first sentence talks about the function of the knee joint, whereas the second sentence talks about the composition of the knee joint. These sentences don't connect well because they talk about different things, even though they have the same subject.

Better example:

The knee joint is the largest joint in the human body. It is made up of several bones and soft tissues.

⊙ Good Organization

A good paragraph should follow all the guidelines discussed in this section. Violating one or more of the guidelines lead to a poorly organized paragraph.

Bad example:

Human facial expression conveys a lot of information about a person like emotion, thoughts, and temperament. One of the most important information obtained through facial expression is the emotional state of a person because it is important to understand each other's emotions when people communicate with each other. People express their emotional states by their facial expressions to another people and understand other people's emotional state from their facial expressions. In other words, facial expressions are important during communication because they are the most natural and essential way to display emotions. Thus, computer systems like human-computer interaction systems need to be able to understand people's emotional state and response appropriately.

Comment:

The sentences talk about different topics, which is evident in the frequent change of sentence subject. As a result, the sentences are not connected properly.

Better example:

Human facial expression conveys a lot of information about human's feeling and emotion. It conveys the internal emotional state of a person such as happiness, sadness, calmness and surprise by changing the muscles under the facial skin. It expresses the emotional states without using spoken words. Thus, it is a form of nonverbal communication between humans.

3 Section, Chapter

⊙ **Bad Section**

Do not write a section with only one paragraph, or a paragraph with only one sentence.

⊙ **Lead Paragraph of Chapter**

A chapter should begin with a lead paragraph that highlights the content of the chapter. The lead paragraph should come before the first section of the chapter.

Example:

Chapter 2 Background

To provide the necessary background of this thesis, this chapter introduces the anatomy and physiology of the normal human heart (Section 2.1) and presents an example of a defective heart with transposition of the great arteries (Section 2.2). A typical surgery to correct this defect, namely arterial switch operation, is then discussed to illustrate the complexity of such cardiovascular surgeries (Section 2.3).

2.1 Anatomy and Physiology of Normal Heart

A normal heart consists of four chambers: left atrium, left ventricle, right atrium, and right ventricle (Fig. 2.1). ...

⊙ **Paragraphs of Section**

Every paragraph should follow from the immediately preceding paragraph and lead to the immediately following paragraph. You can examine the connection of paragraphs by inspecting the lead sentences of the paragraphs.

Bad example:

(Paragraph 1) No one really listens to generated music. ...

(Paragraph 2) By separating and recombining the musical content and style of existing musical compositions, it is possible to generate new music that is creative, natural-sounding with a long-term structure. ...

(Paragraph 3) Although melody can be extracted from the target music easily, it is difficult to determine the degree to which reference harmony can be maximally extracted for recombination with the target melody. ...

(Paragraph 4) One approach to music harmony transfer is to model the music structure computationally at higher levels of abstraction such that the melodic and accompaniment structures of both target and reference music can be compared against each other. ...

Comment:

These lead sentences don't connect to each other properly.

Better example:

(Paragraph 1) Interests in automatic music generation has grown tremendously in recent years. ...

(Paragraph 2) Despite growing research efforts, it is still very difficult to automatically generate music that is both natural and creative. ...

(Paragraph 3) An approach to overcoming these difficulties is called music style transfer. ...

(Paragraph 4) Music style transfer is a very wide and very challenging problem.

Comment:

Each of these lead sentences follow from and lead to the next sentence well.

4 Tables and Figures

⊙ Placement

Place tables and figures as close as possible to the text that refer to them. Place them at the top or bottom of a page. Do not place them in between text because this will disrupt the flow of the text.

⊙ Caption

Table caption should be placed above a table, whereas figure caption should be placed below a figure.

5 Mathematical Notations

⊙ Follow common notational convention

Follow common notational convention to make the math expression clearer.

Type	Font	Examples
scalar	lower-case italic	x, y
large item, set	upper-case italic	R, T
function	lower-case italic	f, g
vectors	lower-case bold	\mathbf{x}, \mathbf{y}
matrices	upper-case bold	\mathbf{A}, \mathbf{B}
indices	lower-case italic	i, j, k
number of items	lower-case italic	m, n

⊙ **Subscripts vs. functions**

Don't confuse subscripts with functions:

- Use subscripts to refer to an item or variable in a list:
Use T_i, \mathbf{x}_i instead of $T(i), x(i)$.
- Use function to refer to a one-to-one or many-to-one mapping:
Use $f(x), f(\mathbf{x})$ instead of $f_x, f_{\mathbf{x}}$.

⊙ **Use simple math symbols**

Use simple math symbols. Avoid using complicated symbols because they make the math equations verbose and harder to read.

good examples	bad examples
R, T	$I_R, I_{Ref}, Image_R$
x, y	$x_{I_R}, color_I$
f, g	Map_{color}
d, D	$Diff, Dist$

⊙ **Avoid using subscripts of subscripts**

Avoid using subscripts of subscripts such as x_{i_j} .

The second-level subscripts are small in font size and difficult to read.

⊙ **Avoid using superscripts for indices**

Avoid using superscripts for indices because they can be confused with power.

For example, x^2 usually means x raised to the power of 2 rather than the second x .

⊙ **Special symbols in superscript**

For different versions of an item, use special symbols in superscript to give consistent names. For example, x, x', x^* .

Bad example:

Let I_{ref} and I_{tar} denote the reference image and the target image, and $Diff$ and $diff$ denote the image difference and the colour difference. Then,

$$Diff(I_{ref}, I_{tar}) = \frac{1}{\text{number of pixels}} \sum_{i=1}^n diff(colour_{ref_i}^I, colour_{tar_i}^I)^2.$$

Comment:

This equation is too verbose and difficult to read.

Better example:

Let c_i^* and c_i denote the colours of pixel i in reference image R and target image T , respectively, each with n pixels. Then, image difference D is computed according to colour difference d as follows:

$$D(R, T) = \frac{1}{n} \sum_{i=1}^n d(c_i^*, c_i)^2.$$

Not-so-bad example:

Let D and d denote image difference and colour difference, respectively. Then,

$$D(R, T) = \frac{1}{n} \sum_{i=1}^n d(c_i^*, c_i)^2,$$

where R and T are the reference image and target image, respectively, c_i^* and c_i are the colours of pixel i of R and T , respectively, and n is the number of pixels.

Comment:

This example is not so bad. The shortcomings include:

- Explaining the symbols after the equation.
- Explaining the symbols in a dry, uninteresting manner.
- Repeated use of “respectively”.

Better example:

Let c_i^* and c_i denote the colours of pixel i in reference image R and target image T , respectively, each with n pixels. Then, image difference D is computed according to colour difference d as follows:

$$D(R, T) = \frac{1}{n} \sum_{i=1}^n d(c_i^*, c_i)^2.$$

References

For more details about good writing style, please refer to the following books:

1. Strunk and White, *The Elements of Style*, 3rd ed., Macmillan, 1979.
2. Van Leunen, *A Handbook for Scholars*, revised ed., Oxford University Press, 1992.