Clustering

Machine Learning in Computer Vision

This report is what I’ve learn about clustering in Machine Learning and Computer Vision.

It is not a document about clustering, I just write down what I found out and try to prove it through examples, tests with skicit-learn so please feel free to correct me if something goes wrong.

A lot of images in this report are borrowed from [Wiki](https://en.wikipedia.org/wiki/Cluster_analysis) and [this online courses](https://www.udacity.com/course/introduction-to-computer-vision--ud810).

|  |  |
| --- | --- |
|  | **More information:** please email me at [14520040@gm.uit.edu.vn](https://mail.google.com/) |

# Overview

What is clustering?

Clustering is the task of dividing data (samples) into a number of groups (clusters). Samples in the same group are more similar to each other than to those in other groups.

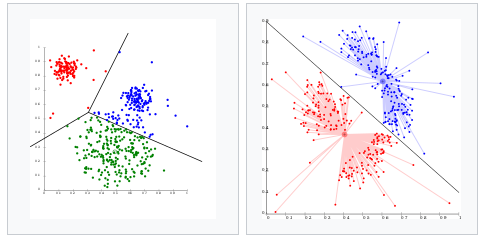


Figure 1. Clustering examples

Note: Since the task of clustering is subjective. It can be used in different ways to achieving different goals.

In the example below, we can use clustering for either grouping by gender or by relationship between people.

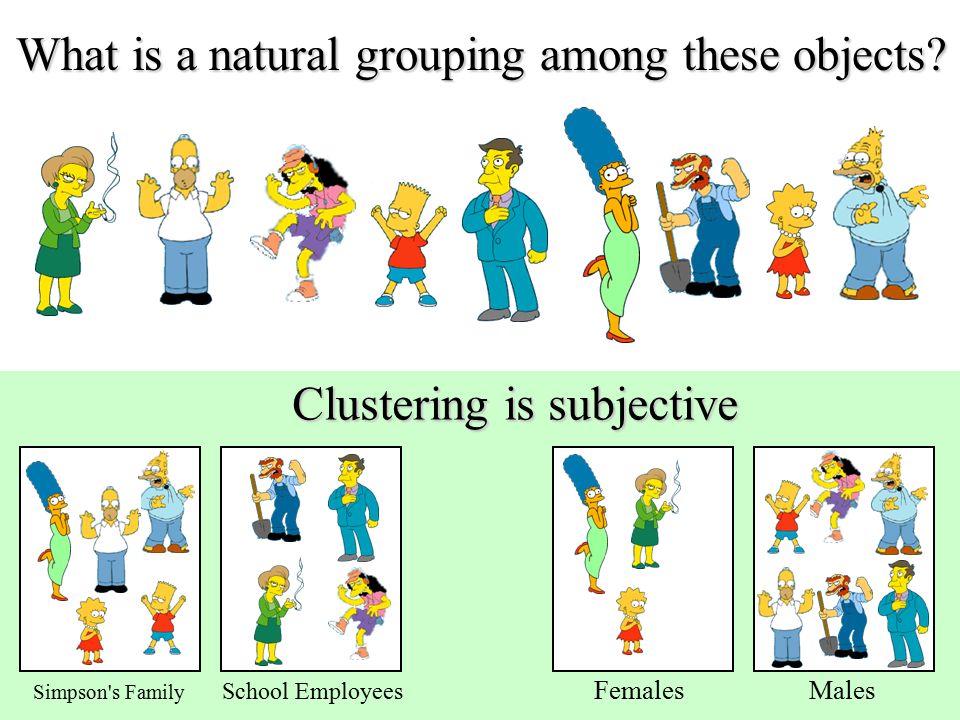


Figure 2. Clustering is subjective

Why do I need clustering in Machine Leanring?

In Machine learning, Clustering is used to find structure of unlabeled data. It is the most common form of unsupervised learning.

Given a dataset we don’t know anything about, a clustering algorithm can discover groups of objects where the average distances between the members of each cluster smaller than to those in other cluster.

How to measure peformance a clustering algorithm?

Which clustering algorithm should I use?

K-means Clustering

Algorithm: Hit return after this line and type some words.

The status bar at the bottom of the window keeps a running count of the number of words in the document.

Example of word count displayed in the status bar

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Share and collaborate

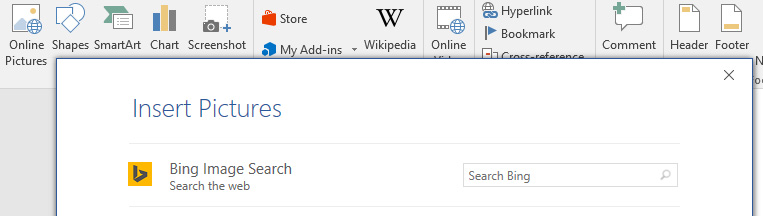
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If they don’t have Word, the document will open in their web browser, in Word Online.

# Add visuals with pictures from the web



Word works with Bing to give you access to thousands of pictures you can use in your documents.

Try it: Hit enter after this line to make a blank line:

1. With your cursor in the blank space above, go to the Insert tab, select **Online Pictures**, and then search for something, like puppy clip art.
2. Select the picture you want, and select **Insert**.

# Make your meaning more visual by formatting text



To format text, select it, and then select a button in the **Font** or **Paragraph** area on the Home tab.

Try it: Select text in the lines below and choose formatting options so that the text is an example of the formatting it’s describing:

|  |  |
| --- | --- |
| Bold command icon | Bold (keyboard shortcut: Ctrl+B) |
| Italics command icon | Italic (keyboard shortcut: Ctrl+I) |
| Highlight command icon | Highlight |
| Font color command icon | Font color |
| Bullets command icon | Bullets |
| Numbering command icon | Numbering |

**Pro tip:** If you selected whole words for this exercise, did you notice that Word popped up a little toolbar, with the font formatting options?

Contextual toolbar with commands for formatting textBetween that and keyboard shortcuts like Ctrl+B and Ctrl+I, you save time by not having to go up to the Home tab all the time.

Make magic: use Heading styles

The heading for this part (“Make magic: use Heading styles”) looks the same as the other headings in this document, but it’s not as useful. It’s formatted with *font settings* (font, size, and color), while the other headings are formatted with a *Heading style* (Heading 1, to be exact).

|  |  |
| --- | --- |
| Heading showing expand/collapse button | See the little triangle when you mouse over those other headings?  You can collapse and expand everything under a heading, like an outline. But this one’s not working. Let’s fix it. |

Try it: Apply the **Heading 1** style:

1. Put your cursor somewhere in the heading above (“Make magic: use Heading styles”) – don’t select anything.
2. On the **Home** tab, find **Styles**, and select **Heading 1** (keyboard shortcut Ctrl+Alt+1).

Ta-da! Now it looks like a heading, and acts like one too.

Give your doc an instant makeover



Style sets and themes let you completely change the look of your document in an instant. They work best when your document is formatted with styles (so it’s good that we fixed that Heading style, above).

Try it: Explore style sets and themes:

1. On the **Design** tab, select **Themes**, and choose a theme from the drop-down.  
   Notice that the gallery of style sets updates to reflect the theme you picked.
2. Select any theme you like from the drop-down and click to apply.

Just for fun

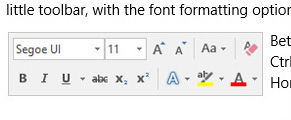
If you have a little more time, give these a try.

Try it: Find and replace

Press **Ctrl+H** and use Find/Replace to replace all the instances of Try it with I tried it.



Try it: Wrap text around pictures

Some of the pictures in this document are placed beside a paragraph of text. Try exploring text wrapping: Select the picture here, go to **Format** > **Wrap Text**, and use the up/down arrow keys to move between the options for a preview of the results.

Get help with Word



The **Tell me** search box takes you straight to commands and Help in Word.

Try it: Get help:

1. Go to **Tell me what you want to do** at the top of the window.
2. Type what you want to do.

For example, type:

* **Add watermark** to quickly get to the watermark command.
* **Help** to go to Word help.
* **Training** to see the list of Word training courses.
* **What’s new** for a list of the most recent updates to Word

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