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Clamping (graphics)

In computer science, **clamping**, or **clipping** is the process of limiting a value to a range between a minimum and a maximum value. Unlike wrapping, clamping merely moves the point to the nearest available value.

In Python, clamping can be defined as follows:

```python
def clamp(x, minimum, maximum):
    if x < minimum:
        return minimum
    if x > maximum:
        return maximum
    return x
```

This is equivalent to `max(minimum, min(x, maximum))` for languages that support the functions **min** and **max**.

Y = clamp(X, 1, 3)	
X	**Y**
0	1
1	1
2	2
3	3
4	3

Uses

Several programming languages and libraries provide functions for fast and vectorized clamping. In Python, the pandas library offers the `Series.clip`[1] and `DataFrame.clip`[2] methods. The NumPy library offers the `clip`[3] function. In the Wolfram Language, it is implemented as `Clip[x, {minimum, maximum}]`.[4]

In OpenGL, the `glClearColor` function takes four `GLfloat` values which are then 'clamped' to the range $[0, 1]$.[5]

One of the many uses of clamping in computer graphics is the placing of a detail inside a polygon—for example, a bullet hole on a wall. It can also be used with wrapping to create a variety of effects.

References

1. "Pandas Series.clip method documentation" (https://pandas.pydata.org/docs/reference/api/pandas.Series.clip.html). Retrieved 2023-10-15.
2. "Pandas DataFrame.clip method documentation" (https://pandas.pydata.org/docs/reference/api/pandas.DataFrame.clip.html). Retrieved 2023-10-15.
3. "NumPy clip function documentation" (https://numpy.org/doc/stable/reference/generated/numpy.clip.html). Retrieved 2023-10-15.
4. "Wolfram Language Clip funcion documentation" (https://reference.wolfram.com/language/ref/Clip.html). Retrieved 2023-10-15.
5. "OpenGL 4 Reference Pages" (https://www.khronos.org/registry/OpenGL-Refpages/gl4/). *www.khronos.org*. Retrieved 2018-10-31.

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