CSS filters

CSS filters are a powerful tool that allow you to apply visual effects to elements, such as images, backgrounds, and even text. They enable you to modify how an element is rendered by manipulating its appearance in various ways, such as blurring, changing color tones, or adding shadows. Filters are applied using the `filter` property in CSS.

Syntax:

```
element {
  filter: filter-function(value);
}
```

Common Filter Functions:

1. **`blur()`**:
    - Applies a Gaussian blur to the element.
    - The value defines the radius of the blur in pixels. Higher values mean more blur.
    - Example:

      ```
      img {
        filter: blur(5px);
      }
      ```

2. **`brightness()`**:
    - Adjusts the brightness of the element.
    - A value of `1` keeps the original brightness, less than `1` darkens the element, and greater than `1` brightens it.

- Example:

```
img {
  filter: brightness(0.5); /* Darkens the image */
}
```

3. **`contrast()`**:
   - Adjusts the contrast of the element.
   - A value of `1` is the default. Less than `1` reduces contrast, while greater than `1` increases it.
   - Example:

```
img {
  filter: contrast(150%); /* Increases contrast */
}
```

4. **`grayscale()`**:
   - Converts the element into grayscale.
   - The value ranges from `0` (no effect) to `1` (completely grayscale).
   - Example:

```
img {
  filter: grayscale(1); /* Completely grayscale */
}
```

5. **`hue-rotate()`**:
   - Rotates the hue of the element's colors.

- The value is a degree of rotation, where `0deg` has no effect, and rotating the hue changes the overall color.
- Example:

```
img {
  filter: hue-rotate(90deg); /* Changes the hue by 90 degrees */
}
```

6. **`invert()`**:
   - Inverts the colors of the element.
   - The value ranges from `0` (no effect) to `1` (complete inversion).
   - Example:

```
img {
  filter: invert(1); /* Completely inverts the colors */
}
```

7. **`opacity()`**:
   - Adjusts the transparency of the element.
   - The value ranges from `0` (completely transparent) to `1` (fully opaque).
   - Example:

```
img {
  filter: opacity(0.5); /* Makes the image 50% transparent */
}
```

8. **`saturate()`**:

- Adjusts the saturation of the element.
- A value of `1` is the default. Less than `1` desaturates the element (makes it more gray), and values greater than `1` oversaturate the colors.
- Example:

```
img {
  filter: saturate(2); /* Doubles the saturation */
}
```

9. **`sepia()`**:
   - Applies a sepia tone to the element, giving it a brownish, old-photograph effect.
   - The value ranges from `0` (no effect) to `1` (full sepia).
   - Example:

```
img {
  filter: sepia(0.8); /* Applies an 80% sepia effect */
}
```

10. **`drop-shadow()`**:
    - Adds a shadow effect to the element.
    - You can control the offset, blur, and color of the shadow.
    - Example:

```
img {
  filter: drop-shadow(10px 10px 5px black); /* Adds a black shadow */
}
```

Multiple Filters:

You can apply multiple filters to an element by chaining them together in the `filter` property.

```
img {
  filter: brightness(0.8) contrast(150%) blur(2px);
}
```

This example will:

- Decrease brightness to 80%,
- Increase contrast by 150%,
- Apply a 2-pixel blur.

Example:

```
<!DOCTYPE html>
<html lang="en">
<head>
  <meta charset="UTF-8">
  <meta name="viewport" content="width=device-width, initial-scale=1.0">
  <title>CSS Filters Example</title>
  <style>
    img {
      filter: sepia(0.7) blur(2px) contrast(120%);
    }
  </style>
</head>
<body>
  <img src="example.jpg" alt="Sample Image" width="300px">
```

```
</body>
</html>
```

In this example:

- The image will have a sepia tone applied at 70%.
- The image will be slightly blurred (2px).
- The contrast of the image will be increased by 20%.

Why Use CSS Filters?

- **Visual Effects**: Easily create artistic effects without needing external image editing tools.
- **Hover Effects**: Filters can be used to create interactive hover effects.
- **Image Enhancements**: Adjust brightness, contrast, or saturation for better visual presentation of images.
- **Creative Design**: Filters can dramatically change the appearance of images and elements for unique designs.

Performance Considerations:

While filters are very powerful, using them excessively can impact performance, especially on large images or if applied on multiple elements in complex layouts.