# Digital Image Processing

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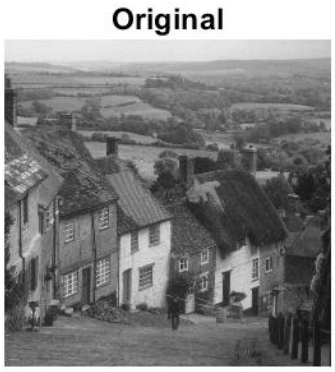
1. *Interpolation by replication*

*MATLAB CODE:*

```
image = imread('goldhill256.bmp');

[r,c,x] = size(image);

N = zeros(2*r,2*c);

for i = 1:1:r
    for j = 1:1:c
        for k = j*2:1:(j*2+2)
            N(2*i,k) = image(i,j);
        end
    end
end

for i = 1:2:r*2
    for j = 1:1:c*2
        N(i,j) = N(i+1,j);
    end
end

figure(1)
imshow(image);
title('Original');

figure(3)
imshow(N,[]);
title('Zoomed')
```



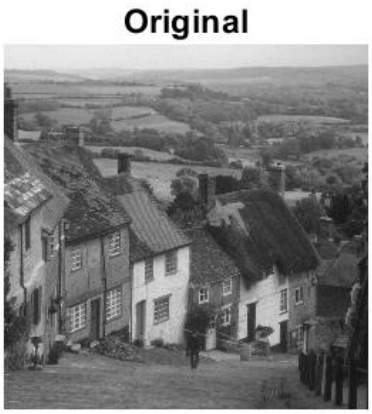
**Zoomed**

2. *Linear Interpolator*

*MATLAB CODE:*

```
image = imread('goldhill256.bmp');

[r,c,x] = size(image);

N = zeros(2*r,2*c);
h = [1 1;1 1];
for i = 1:1:r
    for j = 1:1:c
        for k = j*2:1:(j*2+2)
            N(2*i,k) = image(i,j);
        end
    end
end
```

```
for i = 1:2:r*2
    for j = 1:1:c*2
        N(i,j) = N(i+1,j);
    end
end

r = conv2(N,h/4,'valid');

figure(1)
imshow(image);
title('Original');

figure(3)
imshow(r,[]);
title('Zoomed')
```



**Zoomed**

3. *Cubic Spline Interpolator*

*MATLAB CODE:*

```
img = imread('goldhill256.bmp');
[m,n,x] = size(img);
k = 1;
l = 1;
f = 2;

zoom = zeros(m*f,n*f);
for i = 1:m
for j = 1:n
zoom(k,l) = img(i,j);
l=l+f;
end
k=k+f;
l = 1;
end
H = [1 1;1 1];
h1 = 0.25*conv2(H,H);
h2 = 0.25*conv2(h1,H);
h3 = 0.25*conv2(h2,H);
```

```
r = conv2(zoom,h3,'valid');
figure(1);
imshow(img,[])
title('Orignal’);
figure(2)
imshow(uint8(r));
title('Zoomed');
```