```matlab
clc
clear
close all
img = imread('lena.tif');
img_double = im2double(img);
img_uint8 = uint8(img_double * 255);
img_vector = reshape(img_uint8, 1, []);
img_bits = dec2bin(img_vector, 8);
img_bitstream = reshape(img_bits.', 1, []);
input = str2num(img_bitstream')';
M = length(input);
parity_added = zeros(1,13);
error_detected = zeros(1,13);
a = 1;
for m = 14:-1:2
    n = 2^m-1;
    k = 2^m - 1 - m;
    z = floor(M/k);
    L = z*k;
    H = hammgen(m);
    trt = syndtable(H);
    code = encode(input(1:L),n,k,'hamming/binary');
    output1 = bsc(code, 0.9);
    num_parity_bits = m*z
    parity_added(a) = num_parity_bits;
    error_count = 0;
    N = length(output1);
    for i = 1:n:N
    recd  = output1(i:min(i+n-1, N));
    syndrome = rem(recd * H',2);
    s = bit2int(syndrome',m);
    if s~=0
        error_count = error_count  + 1;
    end
    end
    error_count
    error_detected(a) = error_count;
    a = a + 1;
end
```

```
num_parity_bits = 448
error_count = 32
num_parity_bits = 832
error_count = 64
num_parity_bits = 1536
error_count = 128
num_parity_bits = 2827
error_count = 257
num_parity_bits = 5170
error_count = 516
num_parity_bits = 9396
error_count = 1040
```

```
num_parity_bits = 16976
error_count = 2110
num_parity_bits = 30583
error_count = 4332
num_parity_bits = 55188
error_count = 9056
num_parity_bits = 100820
error_count = 19021
num_parity_bits = 190648
error_count = 37169
num_parity_bits = 393216
error_count = 67902
num_parity_bits = 1048576
error_count = 141156
```

```matlab
plot(parity_added(1:5), error_detected(1:5), '-or');
xlabel('Parity bits used');
ylabel('Error detected');
```