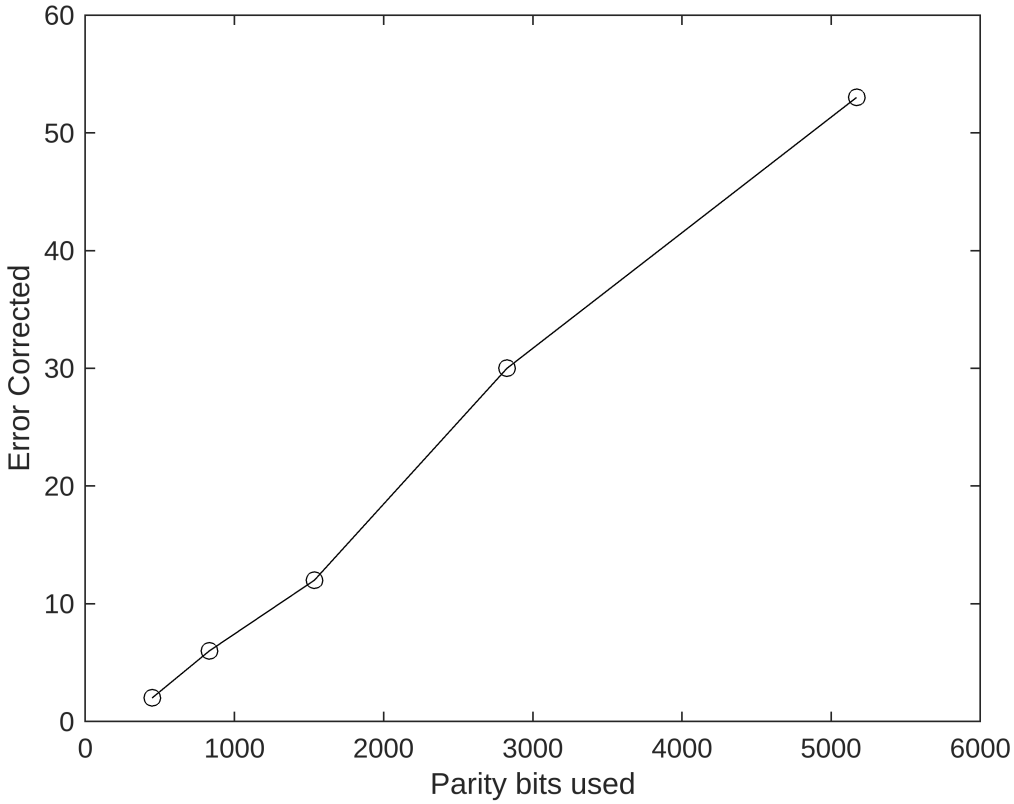
```
clc
clear
close all
img = imread('lena.tif');
img_double = im2double(img);
img_uint8 = uint8(img_double * 255);
img_vector = reshape(img_uint8, 1, []);
img_bits = dec2bin(img_vector, 8);
img_bitstream = reshape(img_bits.', 1, []);
input = str2num(img_bitstream')';
M = length(input);
parity_added = zeros(1,13);
error_corrected = 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, 0.1);
    num_parity_bits = m*z
    parity_added(a) = num_parity_bits;

    error_count = 0;
    N = length(output1);
    for i = 1:n:N

    in = code(i:min(i+n-1, N));
    recd  = output1(i:min(i+n-1, N));

    syndrome = rem(recd * H',2);
    s = bit2int(syndrome',m); %convert to decimal

    corrvect = trt(1+s,:);
    corr_code = rem(corrvect+recd,2);

    e1 = countUnequal(recd,in);
    e2 = countUnequal(corr_code,in);

    if (e1-e2)>0
        error_count = error_count + 1;
    end

    end
    error_count
```

```
    error_corrected(a) = error_count;
    a = a + 1;
end
```

```
num_parity_bits = 448
error_count = 2
num_parity_bits = 832
error_count = 6
num_parity_bits = 1536
error_count = 12
num_parity_bits = 2827
error_count = 30
num_parity_bits = 5170
error_count = 53
num_parity_bits = 9396
error_count = 112
num_parity_bits = 16976
error_count = 204
num_parity_bits = 30583
error_count = 443
num_parity_bits = 55188
error_count = 954
num_parity_bits = 100820
error_count = 3862
num_parity_bits = 190648
error_count = 17256
num_parity_bits = 393216
error_count = 48952
num_parity_bits = 1048576
error_count = 127167
```

```
plot(parity_added(1:5), error_corrected(1:5), '-ok');
xlabel('Parity bits used');
ylabel('Error Corrected');
```




```
function count = countUnequal(arr1, arr2)
    count = 0;
    for i = 1:length(arr1)
        if arr1(i) ~= arr2(i)
            count = count + 1;
        end
    end
end
```