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% Zigzag scan of a matrix
% Argument is a two-dimensional matrix of any size,
% not strictly a square one.
% Function returns a 1-by-(m*n) array,
% where m and n are sizes of an input matrix,
% consisting of its items scanned by a zigzag method.
%
% Alexey S. Sokolov a.k.a. nICKEL, Moscow, Russia
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% alex.nickel@gmail.com

function output = zigzag(in)

% initializing the variables
%----------------------------------
h = 1;
v = 1;

vmin = 1;
hmin = 1;

vmax = size(in, 1);
hmax = size(in, 2);

i = 1;

output = zeros(1, vmax * hmax);
%----------------------------------

while ((v <= vmax) & (h <= hmax))

    if (mod(h + v, 2) == 0)                 % going up

        if (v == vmin)
            output(i) = in(v, h);        % if we got to the first line

            if (h == hmax)
      v = v + 1;
     else
              h = h + 1;
            end;

            i = i + 1;

        elseif ((h == hmax) & (v < vmax))   % if we got to the last column
            output(i) = in(v, h);
            v = v + 1;
            i = i + 1;

        elseif ((v > vmin) & (h < hmax))    % all other cases
            output(i) = in(v, h);
            v = v - 1;
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            h = h + 1;
            i = i + 1;
     end;

    else                                        % going down

       if ((v == vmax) & (h <= hmax))           % if we got to the last line
            output(i) = in(v, h);
            h = h + 1;
            i = i + 1;

       elseif (h == hmin)                       % if we got to the first column
            output(i) = in(v, h);

            if (v == vmax)
       h = h + 1;
     else
              v = v + 1;
            end;

            i = i + 1;

       elseif ((v < vmax) & (h > hmin))         % all other cases
            output(i) = in(v, h);
            v = v + 1;
            h = h - 1;
            i = i + 1;
        end;

    end;

    if ((v == vmax) & (h == hmax))              % bottom right element
        output(i) = in(v, h);
        break
    end;

end;

Error using zigzag (line 22)
Not enough input arguments.
```

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