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function children = GreenModCrossoverScattered(parents, mateIndex)
% EXECUTES A POSITION INDEPENDENT CROSSOVER OF CHROMOSOME ELEMENTS
% M ROWS OF DESIGN CHROMOSOMES ARE MATCHED FOR CROSSOVER BY A SELECTION
% INDEX FROM THE GreenModSelection.m FUNCTION
%
% [MxN DOUBLE] = GreenModCrossoverScattered([MxN DOUBLE], [Mx1 DOUBLE])
%
% INPUTS:
%     parents : ARRAY CONSISTING OF M DESIGN CHROMOSOME VECTORS FOR N
%               DESIGN COMPONENTS
%     mateIndex : VECTOR IDENTIFYING THE ROWS IN THE PARENT ARRAY
%                 TO BE BRED WITH THE MATCHING ROW IN THE ARRAY
%                 WHERE THE VECTOR'S ELEMENT IS POSITIONED.
%                 IE. A FIRST ELEMENT IN selectionIndex of 3 MEANS
%                 THAT THE THIRD ROW IN parents IS TO BE MATED WITH
%                 THE FIRST ROW IN parents TO PRODUCE THE FIRST ROW
%                 OF THE CHILDREN OUTPUT ARRAY
%
% OUTPUTS:
%     children : NEW CHROMOSOME ARRAY AFTER CROSSOVER COMPLETION
%
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% PROJECT: ME 6101 GREEN MODULAR DESIGN GROUP PROJECT
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%
% NOTE: THIS FUNCTION IS BASED ON MATLAB'S crossoverScattered.m FUNCTION

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% DETERMINE SIZE OF CHROMOSOME VECTORS AND NUMBER IN POPULATION
[nchildren, GenomeLength] = size(parents);
% INITIALIZE CHILDREN OUTPUT ARRAY
children = zeros(nchildren, GenomeLength);
% INITIALIZED NEW ARRAY TO MATCH TO PARENT ARRAY FOR MATING
mateArray = parents(mateIndex, :);
% INITIALIZE INDEX
index = 1;
for i=1:nchildren/2
    % PAIR THE PARENTS
    r1 = parents(index, :);
    index = index+1;
    r2 = mateArray(index, :);
    % SELECT 1/2 THE GENES FROM EACH PARENT TO SWAP
    for j = 1:GenomeLength
        if(rand > 0.5)
            children(index-1, j) = r1(j);
            children(index, j) = r2(j);
        else
            children(index-1, j) = r2(j);
            children(index, j) = r1(j);
        end
    end
    index = index + 1;
end
end

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