input: expression matrix E, noise threshold ε, minimum number of rows N_r, minimum number of columns N_c, maximum bicluster overlap in percentage P_o
output: a set of biclusters B

$F_o \leftarrow P_o / 100$
$D_1 \leftarrow$ difference matrix of E
$L_1 \leftarrow \{\}$
for each column vector d in D_1 **do**
  determine the column pair (i, j) in E for d in D_1
  $(V_{ij}, U_{ij}) \leftarrow$ cluster(d, ε, N_r)
  for each $T \in U_{ij}$ **do**
    $L_1 \leftarrow L_1 \cup \{(T, (i, j))\}$
  end for
end for
sort L_1 such that $|U_k| \le |U_{k-1}|$ for $l_k = (U_k, (c_{k1}, c_{k2})) \in L_1$ and $k \ge 2$ to form L_2

B = {}
for $k \leftarrow 1$ to $|L_2|$ **do**
  consider k-th bicluster in L_2, $l_k = (U_k, (c_{k1}, c_{k2}))$
  ValidFlag $\leftarrow$ true
  for each $B_i = (R_i, C_i) \in B$ **do**
    if $c_{k1} \in C_i$ and $c_{k2} \in C_i$ and $|U_k \cap R_i| > F_o \times \min(|U_k|, |R_i|)$ **then**
      ValidFlag $\leftarrow$ false, **break**
    end if
  end for
  if ValidFlag = true **then**
    obtain the second-level difference matrix D_2 with respect to the first column c_{k1} (excluding the difference for columns c_{k1} and c_{k2}) for rows in U_k
    $H_1 \leftarrow \{\}$
    for each column vector d in D_2 **do**
      determine the column i in E for d in D_2
      $(Z_i, W_i) \leftarrow$ cluster(d, ε, N_r)
      for each $W \in W_i$ **do**
        $H_1 \leftarrow H_1 \cup \{(W, i)\}$
      end for
    end for
    sort H_1 such that $|W_{k'}| \le |W_{k'-1}|$ for $h_{k'} = (W_{k'}, c_{k'}) \in H_1$ with $k' \ge 2$ to form H_2
    $R \leftarrow U_k$, $C \leftarrow \{c_{k1}, c_{k2}\}$
    for $k' \leftarrow 1$ to $|H_2|$ **do**
      consider k'-th object in H_2, $h_{k'} = (W_{k'}, c_{k'})$
      $R' \leftarrow R \cap W_{k'}$
      if $|R'| \ge N_r$ **then**
        $R \leftarrow R'$, $C \leftarrow C \cup \{c_{k'}\}$
      end if
    end for
    if $|C| \ge N_c$ **then**
      for each $B_i = (R_i, C_i) \in B$ **do**
        if $|C \cap C_i| > F_o \times \min(|C|, |C_i|)$ and $|R \cap R_i| > F_o \times \min(|R|, |R_i|)$ **then**
          ValidFlag $\leftarrow$ false, **break**
        end if
      end for
    else
      ValidFlag $\leftarrow$ false
    end if
    if ValidFlag = true **then**
      $B \leftarrow B \cup \{(R, C)\}$
    end if
  end if
end for

procedure cluster(X, ε, N_r)
  $S \leftarrow \{\}$, $Q \leftarrow \{\}$
  for each $x_i \in X$ **do**
    find S_i and Q_i
    if S is empty **then**
      if $|S_i| \ge N_r$ **then**
        $S \leftarrow S \cup \{S_i\}$, $Q \leftarrow Q \cup \{Q_i\}$
      end if
    else
      ValidFlag $\leftarrow$ true
      for each $T \in S$ **do**
        if $|x_i - \overline{T}| < \varepsilon$ or $|S_i| < N_r$ or $|\overline{S_i} - \overline{T}| < \varepsilon$ **then**
          ValidFlag $\leftarrow$ false, **break**
        end if
      end for
      if ValidFlag = true **then**
        $S \leftarrow S \cup \{S_i\}$, $Q \leftarrow Q \cup \{Q_i\}$
      end if
    end if
  end for
  $S' \leftarrow \{\}$, $Q' \leftarrow \{\}$
  for each $S_i \in S$ **do**
    find S'_i and Q'_i
    if $|S'_i| \ge N_r$ **then**
      $S' \leftarrow S' \cup \{S'_i\}$, $Q' \leftarrow Q' \cup \{Q'_i\}$
    end if
  end for
  return (S', Q')
end procedure