Algorithm 1: IECT (P, SOI, minSup, minR)
Input: Prefix P, stack_of_Items, minsup, minR
Output: Critical Products (CP)

1: while SOI ≠ ϕ
2: <i, VIP_D, $NVIP_1$, ……, $NVIP_N$> ← pop.SOI
3: suffix←[ ]
4: if (***criteriaRatioOne***(i, VIP_D, $NVIP_1$, ……, $NVIP_N$)≤ minR **AND** ***criteriaRatioTwo*** (i, VIP_D, $NVIP_1$, ……, $NVIP_N$, N)= TRUE) then
5: CP← CP U {append(P,i)}
6: end if
7: for all < i2, $VIP2_D$, $NVIP2_1$, ……, $NVIP2_N$> in SOI
8: if | $VIP_D \cap VIP2_D$ |≥ minSup then
9: push< i2, { $VIP_D \cap VIP2_D$}, {$NVIP_1 \cap NVIP2_1$},……, {$NVIP_N \cap NVIP2_N$}> **TO** suffix
10: end if
11: end for
12: IECT (append(P,i), suffix, minSup, minR)
13: end while

Algorithm 2: criteriaRatioOne (Prefix P, VIP_D, $NVIP_1$, ……, $NVIP_N$)
Input: P, VIP_D, $NVIP_1$, ……, $NVIP_N$
Output: CR1

1: CR1,sum,sumV, S_P ← 0
2: for each group $NVIP_i$ do
3: for each transaction T in $NVIP_i$ do
4: if P is in T then
5: sum←sum+1
6: end if P
7: end for T
8: S_P←S_P+sum
9: end for $NVIP_i$
10: for each transaction T in VIP do
11: if P is in T then
12: sumV← sumV+1;
13: end if P
14: end for T
15: CR1← S_P/sumV
16: return CR1

Algorithm 3: criteriaRatioTwo (Prefix P, VIP_D, $NVIP_1$, ……, $NVIP_N$, Number of NonVIP groups: N)
Input: P, VIP_D, $NVIP_1$, ……, $NVIP_N$, N
Output: TRUE/FALSE

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1:      S_P, SD_Square, SD_Cube ←0
2:      for each group NVIP_i do
3:          for each transaction T in NVIP_i do
4:              if P is in T then
5:                  sum←sum+1
6:              end if P
7:          end for T
8:          S_P←S_P+sum
9:      end for NVIP_i
10:     mean←S_P / N
11:     for each group NVIP_i do
12:         for each transaction T in NVIP_i do
13:             if P is in T then
14:                 sum←sum+1
15:             end if P
16:         end for T
17:         SD_Square←SD_Square+(sum - mean)^2
18:         SD_Cube← SD_Cube +(sum - mean)^3
19:     end for NVIP_i
20:     SD←sqrt(SD_Partial) / N
21:     CR2← SD_Cube/ (SD^3 *(N-1)
22:     if (P is not in any of the NVIP groups OR CR2<0)
23:         return TRUE
24:     else
25:         return FALSE
```