**Example:** Solve knapsack instance M =8 and N = 4. Let $P_i =$ $and$ $W_i$ and Wi are as shown below.

| i | $P_i$ | $W_i$ |
|---|---|---|
| 1 | 1 | 2 |
| 2 | 2 | 3 |
| 3 | 5 | 4 |
| 4 | 6 | 5 |

**Solution:**

Build sequence of decision $S^0, S^1, S^2$.

Initially $S^0 = (0,0)$

$S_1^0 = (1,2)$

This means while building S01 we select the next $i^{th}$ pair. For $S_1^0$ we have selected first (P, W) pair which is (1, 2).

$$\begin{aligned} NowS^1 &= MergeS^0 andS_1^0 \\ &= (0,0),(1,2) \\ S_1^1 &= \{\text{Select next pair (P, W) and add it with S1}\} \\ &= (2,3),(2+0,3+0),(2+1,3+2) \\ &= (2,3),(3,5) \qquad \text{since Repetition of (2, 3) is avoided.} \end{aligned}$$

NowS1=MergeS0andS10=(0,0),(1,2)S11={Select next pair (P, W)

$$\begin{aligned} S2 &= MergeS1andS11 \\ &= (0,0),(1,2),(2,3),(3,5) \\ S21 &= \{\text{Select next pair (P, W) and add it with S2}\} \\ &= (5,4),(6,6),(7,7),(8,9) \end{aligned}$$

S2=MergeS1andS11=(0,0),(1,2),(2,3),(3,5)S21={Select next pair (P, W) and add it with S2}=(5,4),(6

$$\begin{aligned} S3 &= \{\text{Merge S2 and S21}\} \\ S3 &= (0,0),(1,2),(2,3),(5,4),(6,6),(7,7),(8,9) \end{aligned}$$

S3={Merge S2 and S21}S3=(0,0),(1,2),(2,3),(5,4),(6,6),(7,7),(8,9)

Note that the pair (3, 5) is purged from $S^3$. This is because, let us assume $(P_j, W_j) = (3,5) and (P_k, W_k) = (5,4)$, Here $P_j \le P_k$ and $W_j > W_k$ is true hence we will eliminate pair $(P_j, W_j)$ i.e (3, 5) from $S_3$

$$\begin{aligned} S_1^3 &= \{\text{Select next pair (P, W) and add it with S3}\} \\ &= (6,5),(7,7),(8,8),(11,9),(12,11),(13,12),(14,14) \\ S4 &= (0,0),(1,2),(2,3),(5,4),(6,6),(7,7),(8,9),(6,5),(7,7),(8,8),(11,9),(12,11),(13,12),(14,14) \end{aligned}$$

S13={Select next pair (P, W) and add it with S3}=

Now we are interested in M =8. We get pair (8, 8) in $S^4$. Hence we will set $X_4 = 1$. Now we select next object $(P – P_4)$ and $(W – W_4)$ (8 - 6) and (8 - 5). i.e (2, 3) Pair (2, 3) € $S^2$ hence set $X_2 = 1$. So we get the final solution as (0, 1, 0, 1)