- This algorithm is one of the first performing algorithms that focuses on the construction of α-vectors and on the value function update for a finite set $\mathcal{B}$

- The set $\mathcal{B}$ is expanded at each iteration until a given size $|\mathcal{B}| \leq N_\mathcal{B}$.

- The update operator $\tilde{L}_{\text{PBVI}}$ calculates at each step the value function of the set $\mathcal{B}$, such as:

$$\tilde{L}_{\text{PBVI}} V_n = \bigcup_{b \in \mathcal{B}} backup(b)$$

- (Pineau et al., 2003) demonstrated that the error of the approximation of the value function is bounded and depends on the density of $\mathcal{B}$.

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input : POMDP, N_i, $N_\mathcal{B}$
output: value function V
Initialize V_0, $n = 0$;
$\mathcal{B} \leftarrow b_0$;
$V_1 \leftarrow \varnothing$;
repeat
    $n = n + 1$;
    Expand $\mathcal{B}$;
    $V_n \leftarrow \varnothing$;
    Compute $\Gamma^{a,o}$ projections of V_{n-1};
    for $b \in \mathcal{B}$ **do**
        $V_n \leftarrow \bigcup backup(b)$;
    $V_{n-1} \leftarrow V_n$;
until $n < N$ ou $\| \max_{\alpha_n \in V_n} \alpha_n \cdot b - \max_{\alpha_{n-1} \in V_{n-1}} \alpha_{n-1} \cdot b \| < \epsilon, \forall b \in \mathcal{B}$;