Function "ExpectedGraspScore(β, θ, φ, $\mathcal{P}_o$)"

Output: q

$q \leftarrow 0$;
for $p \in \mathcal{P}_o$ **do**
  $q \leftarrow q + \beta(p)\,\theta(\varphi, p)$;
end

Function "GraspArgMax(β, γ, $\mathcal{P}_o$, $\mathcal{X}_g$)"

Output: x_g^*

$x_g^* \leftarrow \varnothing$;
$q_{\max} \leftarrow 0$;
for $x_g \in \mathcal{X}_g$ **do**
  $q \leftarrow$ `ExpectedGraspScore` $(\beta, \gamma, x_g, \mathcal{P}_o)$;
  if $q_{\max} < q$ **then**
    $q_{\max} \leftarrow q$;
    $x_g^* \leftarrow x_g$;
  end
end

Procedure "UpdateBelief(β, $\hat{P}$, o, x_s, $\mathcal{P}_o$)"

Output: $\hat{\beta}$

$q \leftarrow 0$;
for $p \in \mathcal{P}_o$ **do**
  $q \leftarrow q + \beta(p)\,\hat{P}(o|p, x_s)$;
end
for $p \in \mathcal{P}_o$ **do**
  $\hat{\beta}(p) \leftarrow \frac{\hat{P}(o|p,x_s)\beta(p)}{q}$;
end

Algorithm 1: Calculate VOA

Input: Sensor Configuration x_s.
Input: Sensor Belief β_s.
Input: Gripper Belief β_g.
Input: Perceived Observation Probability $\hat{P}$.
Input: Grasp Score Function γ.
Input: Observation Generator Function α.
Input: Object Pose Set $\mathcal{P}_o$.
Input: Grasp Configuration Set $\mathcal{X}_g$.
Output: u

$x_g^* \leftarrow \texttt{GraspArgMax}\left(\beta_g, \gamma, \mathcal{P}_o, \mathcal{X}_g\right)$;
$q_\gamma \leftarrow \texttt{ExpectedGraspScore}\left(\beta_g, \gamma, x_g^*, \mathcal{P}_o\right)$;
$u \leftarrow 0$;
for $p \in \mathcal{P}_o$ **do**
    $o = \alpha\left(p, x_s\right)$;
    $\hat{\beta}Gripper \leftarrow \texttt{UpdateBelief}\left(\beta_g, \hat{P}, o, x_s, \mathcal{P}_o\right)$;
    $x_g^* \leftarrow \texttt{GraspArgMax}\left(\hat{\beta}Gripper, \gamma, \mathcal{P}_o, \mathcal{X}_g\right)$;
    $q \leftarrow \texttt{ExpectedGraspScore}\left(\hat{\beta}Gripper, \gamma, x_g^*, \mathcal{P}_o\right)$;
    $u \leftarrow u + q \cdot \beta_s\left(p\right)$;
end
$u \leftarrow u - q_\gamma$;