SPOT algorithm

Using SPOT to detect anomalies in the residuals.

Algorithm 1: SPOT algorithm

Input : $\{r_1, \ldots, r_T\}$, n, α, and p_u
Output: Flagged residuals

Using $\boldsymbol{r}_n = |r_1|, \ldots, |r_n|$, compute u as the $p_u * 100\%^{\text{th}}$ percentile
Using POT approach, fit a GPD to the excesses over u to estimate ξ and σ
Compute τ_α as the $(1-\alpha) * 100\%^{\text{th}}$ percentile from the fitted GPD with the parameter estimates $\hat{\xi}$ and $\hat{\sigma}$
if $|r_i| > \tau_\alpha$ *for* $i = 1, \ldots, n$ **then**
    Flag r_i as an outlier
    Remove r_i from $\boldsymbol{r}_n$, re-calibrate τ_α following steps 2 and 3
end
for $i > n$ **do**
    if $|r_i| > \tau_\alpha$ **then**
        Flag r_i as an outlier
    else if $|r_i| > u$ **then**
        Flag r_i as a typical point
        Add $|r_i|$ to $\boldsymbol{r}_n$
        Estimate the GPD parameters ξ, σ
        Compute τ_α
    else
        Flag r_i as a typical point
    end
end