Importance sampling algorithm

Data: $y^{r,\,s_{\text{curr}}}$, the wILI observations so far; $z^{r,s_{\text{curr}}}$, a version of $y^{r,\,s_{\text{curr}}}$ with two extra points estimated from GFT; prior distributions of wILI curves, noise levels, and transformations
Result: weighted collection of curves
Let $\phi(x;\mu,\sigma)$ be the normal pdf;
for *a large number of times* **do**
  Randomly draw f^r, σ, ν, θ, and μ from the corresponding priors;
  Let $f^{r,\,s_{\text{curr}}}(i) = f_4^r(i) = b^r + \frac{\theta^r - b^r}{\max_j f^r(j) - b^r}\left[f^r\left(\frac{i-\mu^r}{\nu^r} + \arg\max_j f^r(j)\right) - b^r\right]$;
  Calculate weight $w = \prod_{i=1}^{\text{length}(z^{r,s_{\text{curr}}})} \phi(z; f^{r,\,s_{\text{curr}}}(i), \sigma)$;
  Let v be a 53-length vector, a possible curve for this season;
  for i *in* 1..length($y^{r,\,s_{\text{curr}}}$) **do**
    $v_i := y_i^{r,\,s_{\text{curr}}}$;
  end
  for i *in* (length($y^{r,\,s_{\text{curr}}}$) + 1)..53 **do**
    $v_i := f^{r,\,s_{\text{curr}}}(i)$;
  end
  Add curve v with weight w to the collection of possibilities for this season (the posterior estimate)
end

Algorithm 1: Importance sampling procedure

Note that, since the GFT estimates are not exact, we weight $f^{r,\,s_{\text{curr}}}$ based on $z^{r,s_{\text{curr}}}$, using both ILINet wILI observations and GFT data, but we construct each possible curve v using $f^{r,\,s_{\text{curr}}}$ and $y^{r,\,s_{\text{curr}}}$, using no GFT. However, since ILINet data can undergo revisions, we have also considered versions that construct each v ignoring some of the more recent values in $y^{r,\,s_{\text{curr}}}$.

To improve computational efficiency, we also use a modified version of the code above that first divides up the possible values of f^r, σ, ν, θ, and μ into bins and estimates the average weight of $f^{r,\,s_{\text{curr}}}$'s in each bin. By sampling values of f^r, σ, ν, θ, and μ more frequently from the higher-weighted bins (and correcting for this decision in the weight calculation), we are able to construct a collection of curves with a high total weight more quickly than the version above.