Feasibility A score S is **'Feasible'** [1] if it assigns bad scores to forecasts that give material probability to highly improbable events. Specifically (for a negatively oriented score), let $\lambda = \inf\{p(z)|z \in \text{supp}(p)\}$, this is the probability density of the least likely outcome, the infimum (where supp(p) denotes the support of the random variable with pdf p). For any $\epsilon > 0$ define a set $M_\epsilon := \{z|p(z) < \lambda + \epsilon\}$; when ϵ is small these are the set of observations that the forecast ascribes small probability density to. Let $\mu = \inf\{S(z,p)|z \in M_\epsilon\}$, the best score amongst the minimal probability events. Then a score is Feasible if $S(z,p) \leq \mu \; \forall z \notin M_\epsilon$, that is, for any observation that is not in M_ϵ the skill score ascribes a better or equal score than μ to the forecast.

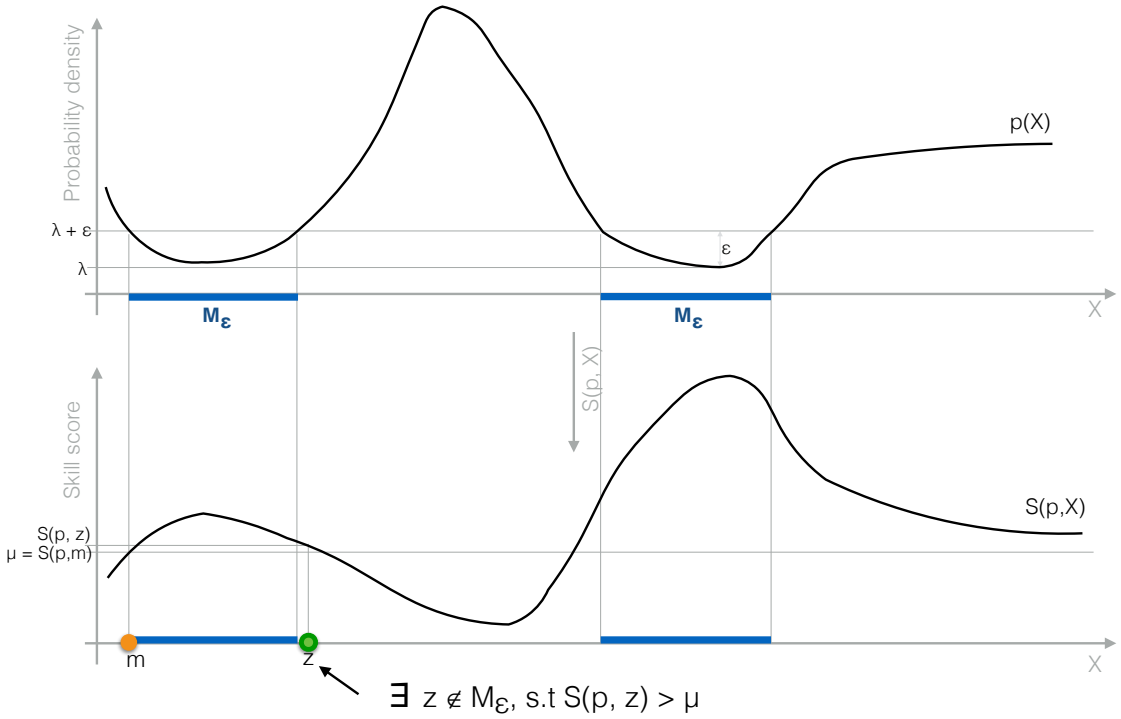

Figure 1: Illustration of Feasibility property for a skill score that is **not** Feasible. The top graphic shows the forecast probability density (p) of the observed variable X, where $\lambda = \inf\{p(z)|z \in \text{supp}(p)\}$ the probability density of the least likely observation. ϵ is a given small real number and M_ϵ is the set of values with probability density within ϵ of λ, informally, the set of observed values that are expected to arise with low probability, or 'minimal probability events'. The lower graphic shows the skill score value arising for different observed values X and $\mu = \inf\{S(z,p)|z \in M_\epsilon\}$, is the best score amongst the minimal probability events, the observed value m which corresponds to this best score is illustrated by an orange solid dot. This skill score is not 'Feasible' because the value z (illustrated by a green dot with dark border) is outside of the minimal probability events M_ϵ yet has a worse (i.e higher) score than m, formally $S(p,z) > \mu$.

Bibliography

[1] T. Maynard. Extreme Insurance and the Dynamics of Risk. PhD thesis, London School of Econmics and Political Science, 2016.