Summary of training phase forecasting results: German flu forecasting

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Overview

This document summarizes the performance of time-series forecasting models developed by UMass-Amherst Biostatistics PhD students for a PhD Seminar. The goal was to create forecasting models that accurately forecasted influenza incidence in Germany. We used as the gold-standard data a time series obtained from the Robert Koch Institut (RKI), a national public health agency in Germany. The training dataset is shown below.

Results across all regions

model	avg_bias	ci50_cov	ci80_cov	ci90_cov
EmpiricalBayes	-0.25	0.19	0.31	0.32
DL4EPI	0.28	0.56	0.73	0.76
hetGP	-0.33	0.39	0.66	0.70
SIRS_EAKF	-0.92	0.18	0.41	0.50
seasonalGAM	-0.97	0.73	0.88	0.90
sarimaTD	-1.85	0.48	0.78	0.86

Results by region

location	DL4EPI	EmpiricalBayes	hetGP	sarimaTD	seasonalGAM	SIRS_EAKF
Baden-Württemberg	0.75	0.72	0.63	-0.50	0.04	0.85
Bavaria	1.43	-0.38	0.98	-0.55	0.27	1.59
Berlin	-0.13	2.53	-0.67	-2.05	-1.32	-0.53
Brandenburg	0.04	-2.41	-0.34	-2.48	-1.46	-0.93
Bremen	0.27	1.74	0.12	-0.20	-0.01	-0.16
Hamburg	-0.25	0.34	-2.26	-3.15	-2.01	-1.44
Hesse	0.19	0.69	0.07	-0.55	-0.27	-0.05
Lower Saxony	0.49	0.31	0.12	-0.58	-0.18	0.30
Mecklenburg-Vorpommern	-0.27	-3.21	-1.74	-4.58	-2.75	-2.76
North Rhine-Westphalia	0.15	0.12	-0.26	-0.58	-0.33	-0.27
Rhineland-Palatinate	0.59	0.38	0.28	-1.17	-0.43	0.32
Saarland	0.26	1.66	-0.03	-0.38	-0.11	0.18
Saxony	1.14	-3.02	1.26	-3.33	-1.39	-2.96
Saxony-Anhalt	0.33	-4.07	-2.31	-4.64	-2.50	-4.98
Schleswig-Holstein	0.06	1.49	-0.10	-0.93	-0.56	0.03
Thuringia	-0.62	-0.86	-1.00	-3.94	-2.45	-3.95

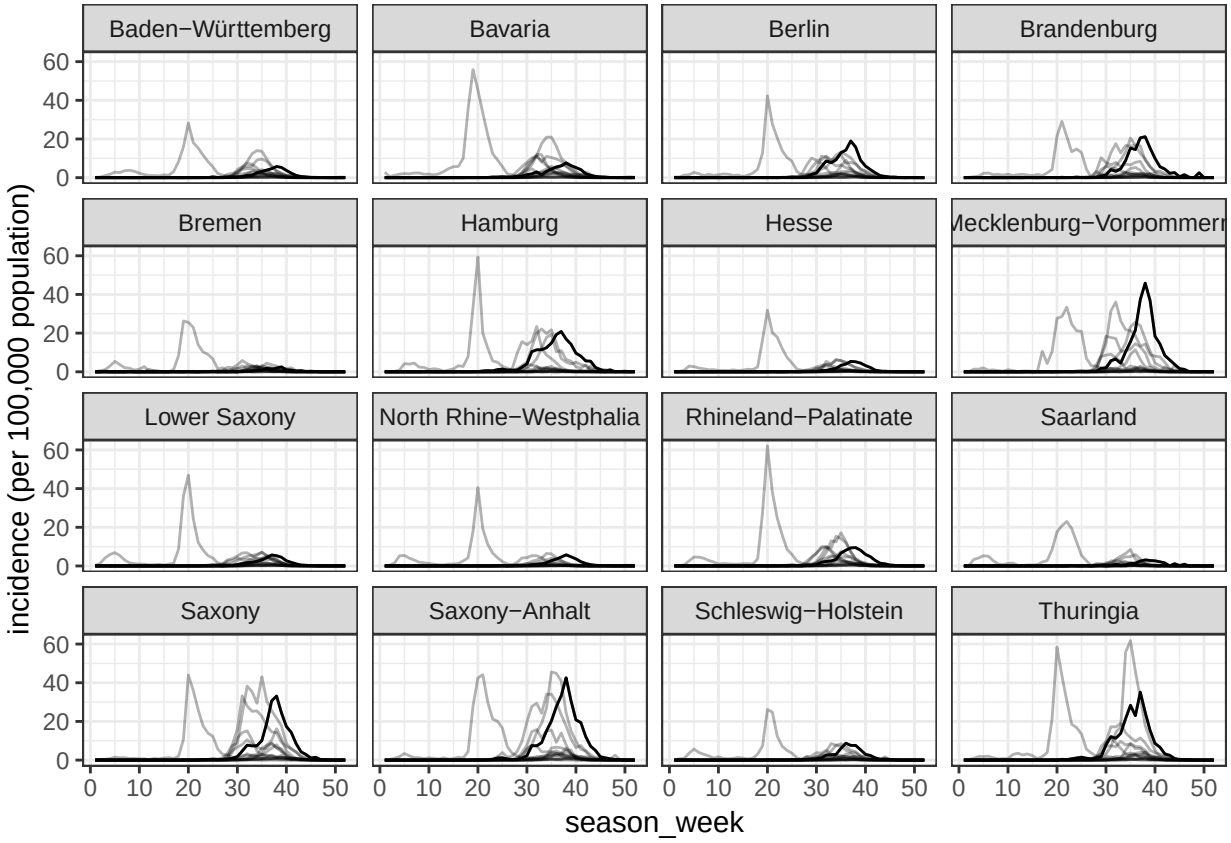

Figure 1: Training data, stratified by state, with the one season evaluated for training showed in darker color

Results by target

step	EmpiricalBayes	DL4EPI	hetGP	SIRS_EAKF	seasonalGAM	sarimaTD
1	-0.18	0.03	-0.31	-1.43	-0.93	-1.64
2	-0.17	0.00	-0.32	-1.34	-0.95	-1.75
3	-0.17	0.13	-0.32	-0.76	-0.95	-1.84
4	-0.23	0.34	-0.33	-0.37	-0.96	-1.91
5	-0.33	0.23	-0.34	-0.57	-0.99	-1.98
6	-0.44	1.00	-0.34	-1.02	-1.02	-2.02