

Experiment Results

Automatically Generated

February 19, 2019

1 Overview

Overview of kernel search results.

Best Kernel:

Short Form:

LIN0 + PER0 + LIN0

Long Form:

LIN0(variances=0.000000) + PER0(variance=2124528.096379, period=19.992710, lengthscale=245.127354) + LIN0(variances=0.000000)

2 Results

Here are some plots summarizing the kernel search.

2.1 Model Score Evolution

A summary of the distribution of model scores.

2.2 Kernel Structure Evolution

A summary of the structure of kernels searched.

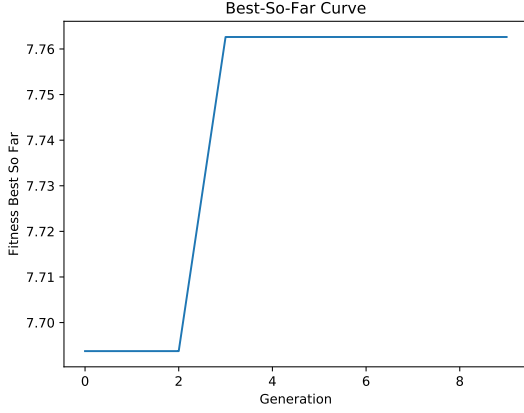
2.3 Population Evolution

A summary of the population of kernels searched.

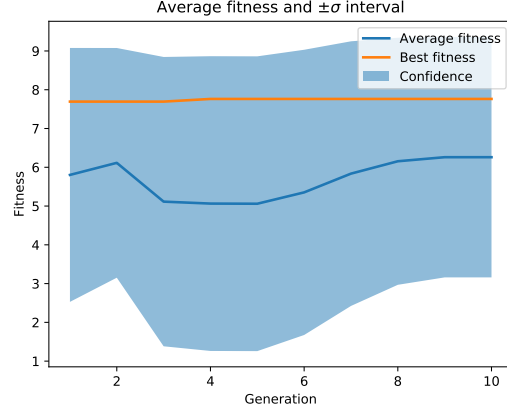
2.4 Model Plot

3 Timing Report

Here is a summary of the execution time of various parts of the algorithm.

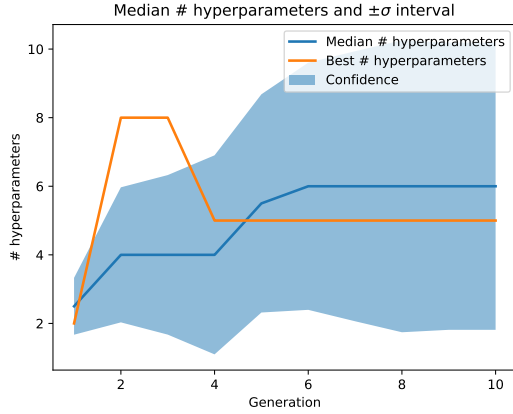


(a) A plot of the maximum score over each iteration.

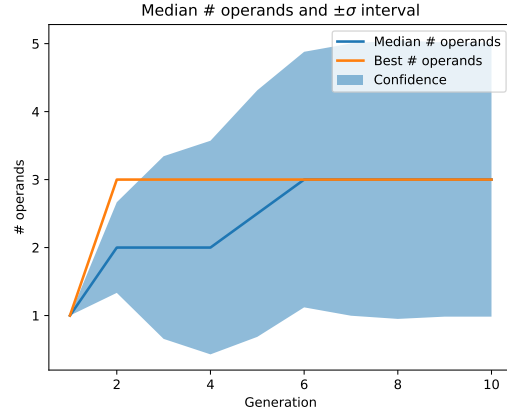


(b) A distribution of the maximum model score, the mean model score, and standard deviation of models scores per iteration.

Figure 1: These two figures show the model scores. The left shows a best-so-far curve and the right one shows a distribution of scores.



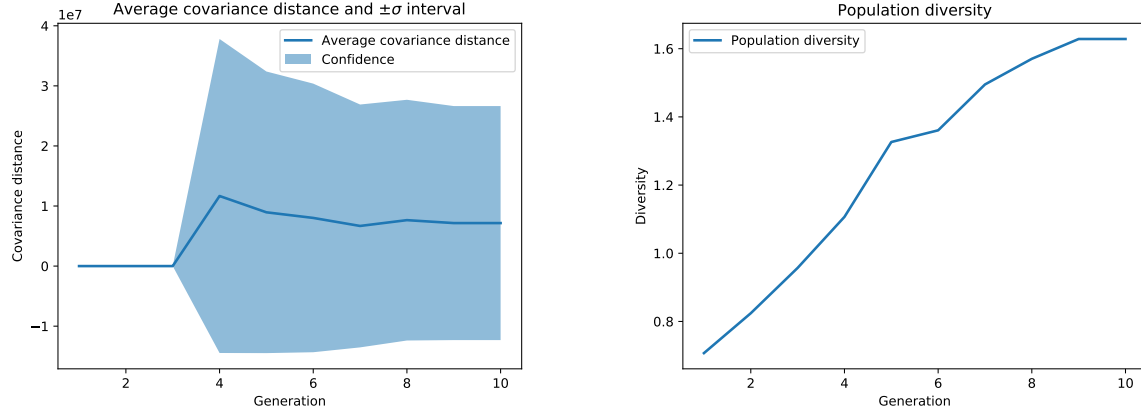
(a) A plot of the number of hyperparameters for each iteration of the best model, the median number of hyperparameters, and the standard deviation.



(b) A plot of the number of operands (number of 1-D kernels) over time including the best model, the median number of operands, and the standard deviation.

Figure 2: These two figures show how the structure of the compositional kernels changed over time. The left figure shows the hyperparameter distribution and the right one shows operand distribution.

Section	Time Taken (s)	Time Taken Percentage
Optimization	492.74	92.43%
Other	38.35	7.19%
Expansion	1.72	0.32%
Evaluation	0.26	0.05%



(a) This plot shows the mean Euclidean covariance distance over time of all pairs of kernel matrices. It represents the heterogeneity of the population.

(b) This plot shows the mean Euclidean distance of all pairs of kernel expressions in additive form. It represents the diversity/heterogeneity of the population.

Figure 3: Two figures showing the evolution of the population heterogeneity.

4 Predictive Performance

An evaluation of the performance of the best model discovered.

4.1 Best Model Summary

This table contains various scores of the best model.

NLL	NLL (normalized)	Mean NLPD	BIC	AIC	PL2
86.852	-1.086	39076896.767	178.086	175.704	1.092

4.2 Comparison to Other Models

This table contains the RMSE of the best model and others.

Best Model	Linear Regression	Support Vector Regression	GP (RBF kernel)	k-NN Regression
8978.133	8978.128	8978.217	8978.166	8978.131

5 Experimental Parameters

This section contains the parameters of the experiment

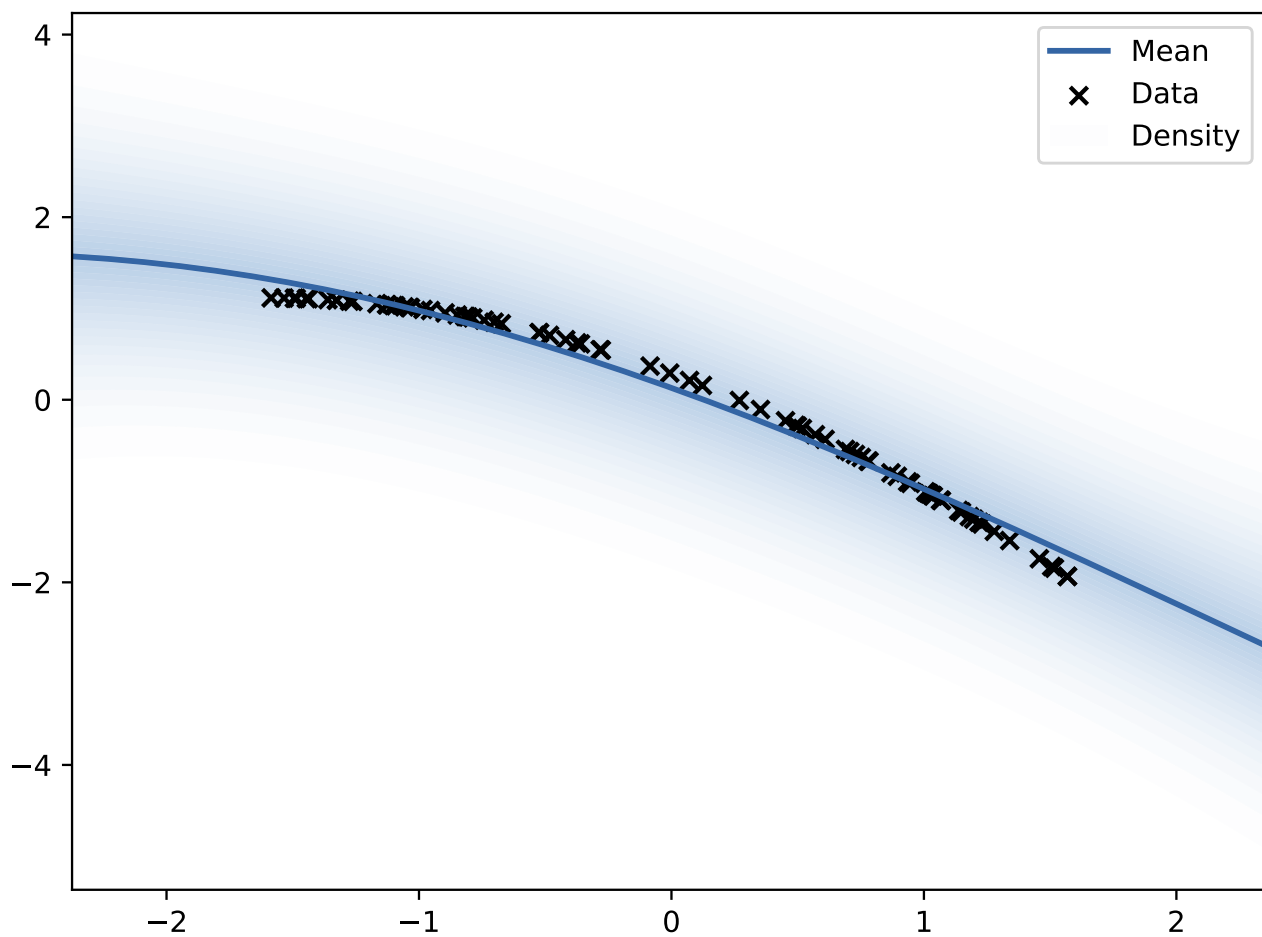


Figure 4: A plot of the fit of the best Gaussian Process discovered in the search.