

Timely, safe, and efficient winter travel is a high priority for the Colorado Department of Transportation (CDOT). Interstate 70 (I70) is a key travel corridor going from Denver to Grand Junction that presents many challenges during the winter months. Drivers heading to and from the mountains on I70 can encounter delays up to several hours long and poor weather is often a key factor contributing to these delays. CDOT is seeking ways to respond more effectively to hazardous weather along the I70 corridor and is interested in obtaining better road weather and travel time forecasts to optimize operations and maintenance practices. Along these lines, CDOT is in the process of instrumenting approximately 200 vehicles with sensors obtained from WxCloud to effectively measure road weather and travel speed conditions along the I70 corridor. The National Center for Atmospheric Research (NCAR) has been working in conjunction with CDOT and WxCloud on a decision support system that will integrate road weather forecasting with travel time estimation. In this regard, NCAR has configured the Pikalert® road weather forecasting system for the Colorado I70 domain and is in the process of modifying the system to support travel time estimation and forecasting.

The Pikalert® System is a system developed by NCAR for the Federal Highway Administration that integrates mobile observations, weather observations, and weather forecasts to provide road maintenance decision support and guidance to the travelling public out to 72 hours. The system leverages mobile observations in assessing current road conditions and in tuning road weather, road condition, and road treatment forecasting. The system contains displays that show current and forecast road conditions, current vehicle observations, RWIS observations including camera images, weather radar overlays, and road segment weather and treatment information.

NCAR is currently working on incorporating travel time capability into Pikalert®. Accurate travel time information supports making better travel decisions, route selection, departure scheduling, and selecting the appropriate mode of transportation.

The domain of interest in this study includes the I-70 mountain corridor between Golden and Vail. The western portion of the route begins in Golden, and climbs through Idaho Springs to the Eisenhower Tunnel. It then descends to Silverthorne and then climbs up to Vail. Average travel times on the road segments in this study vary from 1 to 14 minutes depending on segment lengths. The 99th percentile travel times vary from 1½ minutes to 24 minutes. Finally, the maximum travel times vary from 7½ minutes to 6.6 hours. These extreme travel times are linked to significant weather events involving accidents. By plotting a histogram of the monthly travel time data, it is easy to see that the longer travel times occur during the winter months.

This particular study utilizes machine learning techniques such as random forests, gradient boosted trees, and support vector regression to support travel time prediction. Our intuition tells us that travel time is affected by time of day, day of week, month of year, holidays, snowfall, icy roads, accidents, construction, etc. These fields serve as predictors and the actual travel time or deviation from median travel time serve as the target of interest. The study is currently underway and results are expected in the June 2016 timeframe.