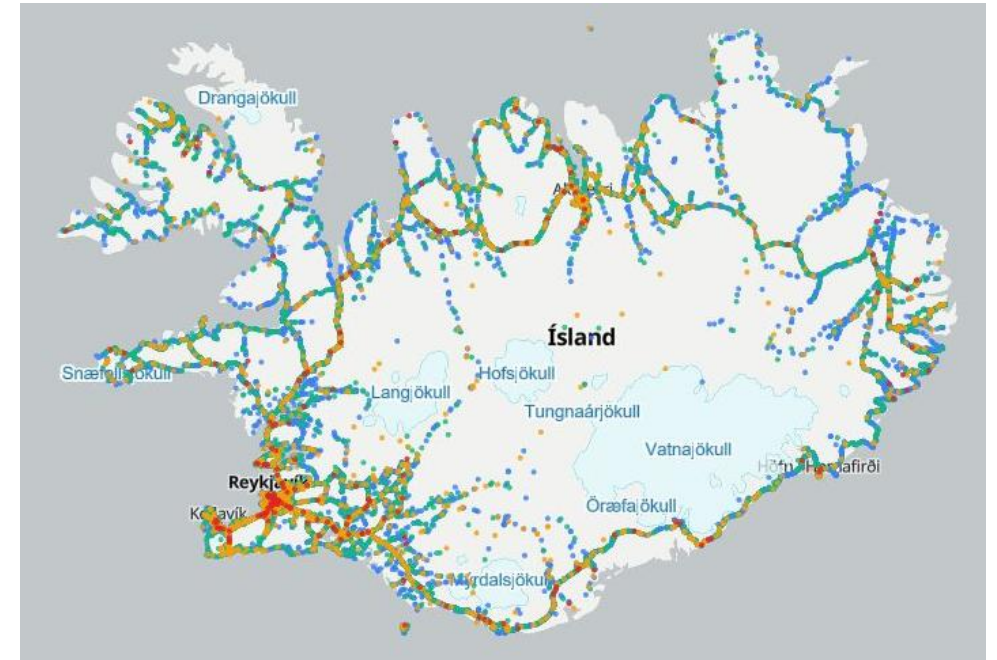


Interactive Visualisation of Traffic Accident and Weather Data in Iceland

Linked records and experiments on Elja

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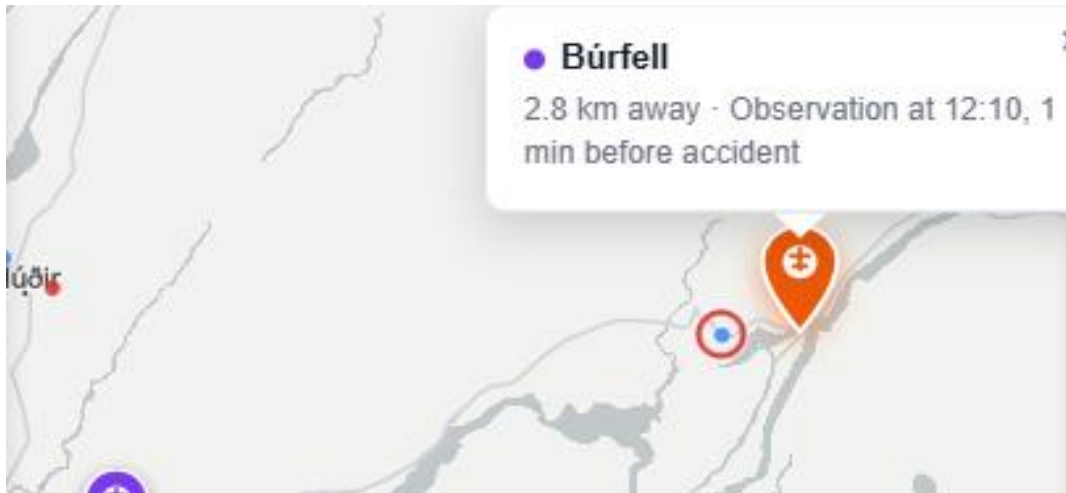


Map data © OpenStreetMap contributors
Tiles: OpenFreeMap / OpenMapTiles

Accident records with nearby weather

126,607 accidents

2007–2025, from Samgöngustofa
Weather: Veðurstofa Íslands



Búrfell: 2.8 km away, reading 1 minute before

Location

Three nearest eligible automatic stations
active in the accident year

Time

Ten-minute readings: within ± 30 minutes
Hourly fallback: within ± 60 minutes

Source details

Station distance and observation time
Almost every accident has a weather match

Map data © OpenStreetMap contributors. Tiles: OpenFreeMap / OpenMapTiles.

Exploring the records on the map

LANGUAGE

ISEN

Filters

Reset

QUICK FILTERS

❄ Winter

☀ Summer

Last 3 years

Past 12 months

SEVERITY LEVEL

Fatal accident

Serious accident

Minor injuries

No injuries

<

>

● Búrfell

2.8 km away · Observation at 12:10, 1 min before accident

Accident #125825

✕

● No injuries

📅 DATE & TIME

04.10.2025 12:11:00

📍 LOCATION

Þjórsárdalsvegur, Skeljafell - Á eða við akbraut

64.11670, -19.80211

🌤 WEATHER CONDITIONS

Temperature

6.1°C

Precipitation

0.0 mm

Wind

5.5 m/s WNW

Gusts: 7.3 m/s

Humidity

56%

Icelandic
and English

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Filter

Year, season, severity
and weather

Select an accident

Inspect injuries, vehicles
and nearby observations

Check the source

See station distance
and reading time

Modelling experiments on Elja

32

CPU cores

128 GB

memory requested

4 h 27 min

elapsed job time

Severity classification and monthly forecasting

Step	What it does
Prepare a script	Run the experiment without an open notebook
Submit through SLURM	Schedule the job on Elja
Run and save results	Fit models in parallel and keep their outputs

AutoGluon and TabPFN: severity. Chronos-Bolt: monthly counts.

Three models, two questions

Question 1 · How severe was each accident?

Question 2 · Accidents per month

	AutoGluon Automatic ML: tries ~34 models	TabPFN Foundation model for tables	Chronos-Bolt Foundation model for time series
Reads	Weather, time and place of each accident	The same information	Past monthly accident totals
Learns from	102,241 accidents, 2007–2022	10,000-accident sample, 2007–2022	204 months, 2007–2023
Predicts	Fatal, serious, minor or no injuries	The same 4 categories	The next 24 monthly totals
Tested on	24,292 accidents, 2023–2025	The same 24,292 accidents	24 months, 2024–2025

All three were tested on later years they never saw. Baseline = always predict “no injuries”.

The model missed the rare injury cases

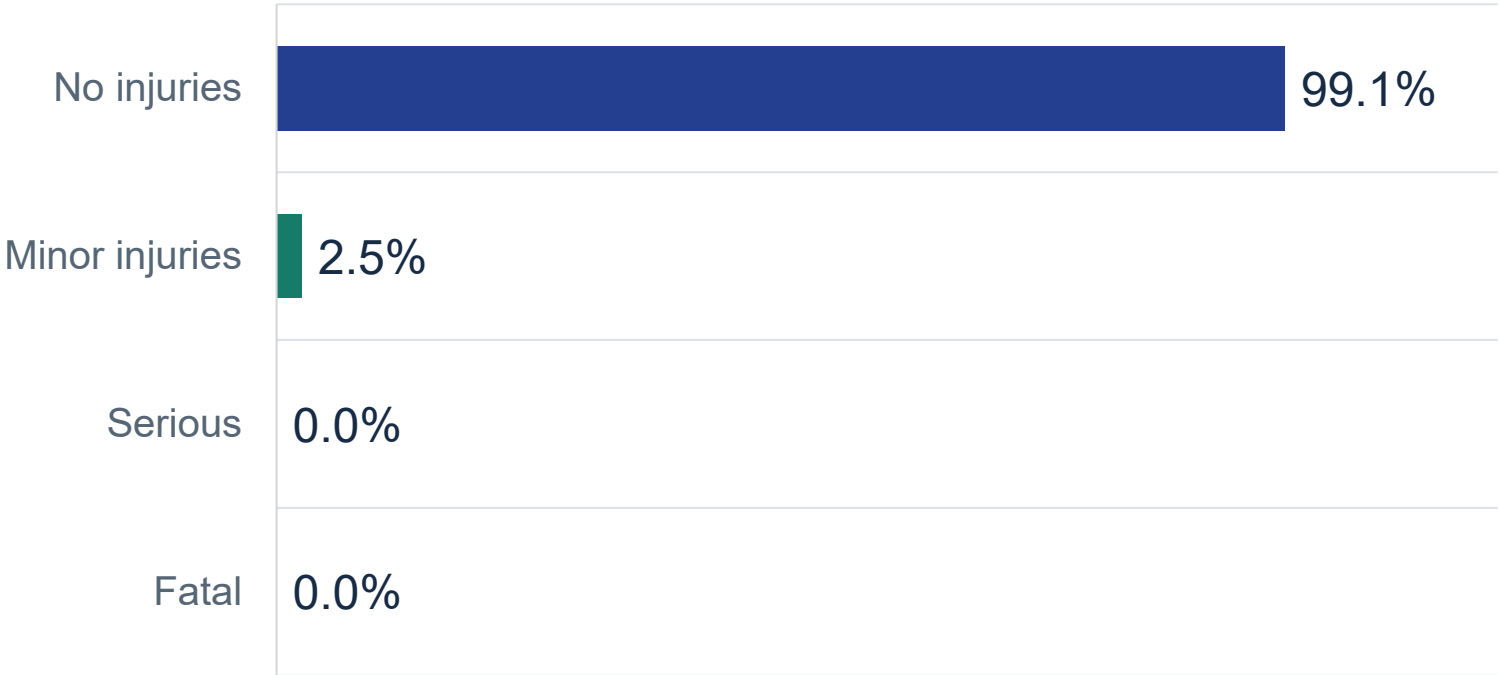
Baseline 0.829
Model 0.831

Overall score: weighted F1
Baseline always says “no injuries”

0 of 28
fatal accidents identified

Recall for each accident category

Recall: share of actual cases correctly identified

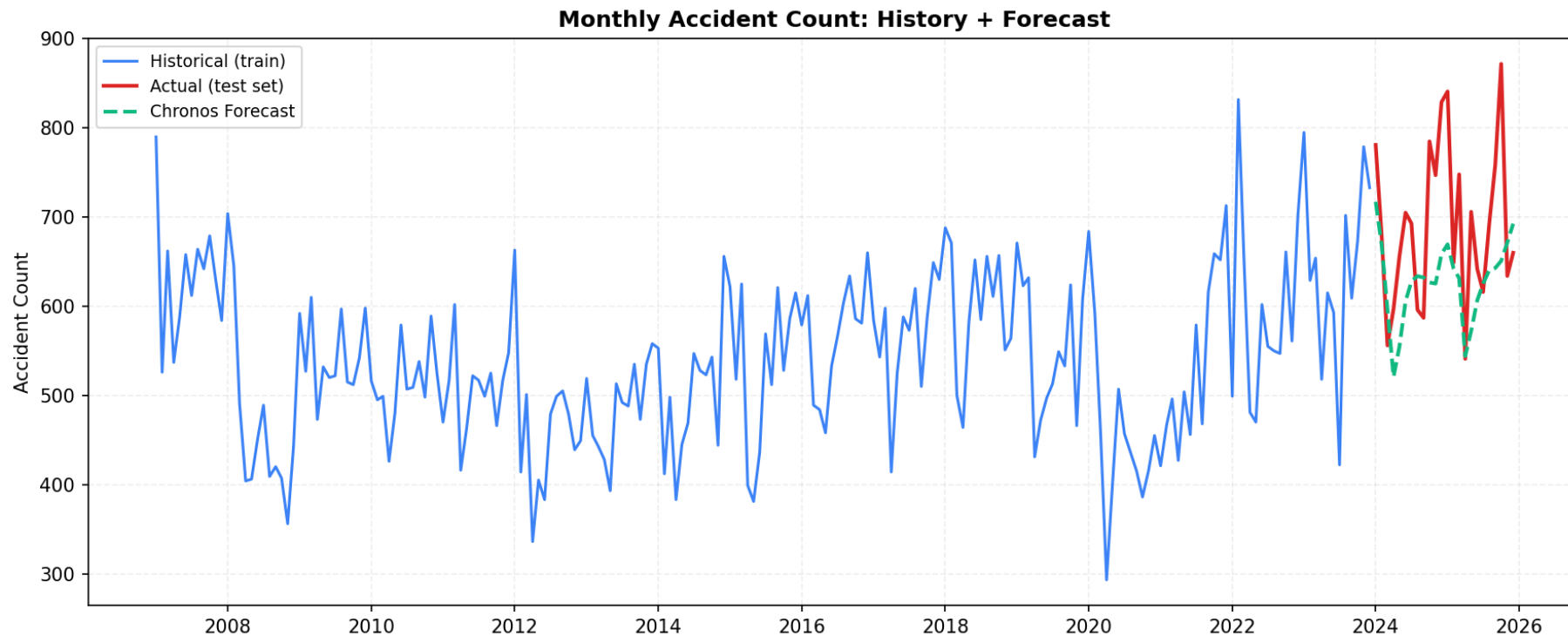


Test set: 28 fatal, 531 serious, 2,265 minor-injury and 21,468 no-injury accidents.

Forecasting monthly accident counts

204 months of history

24 months for testing: 2024–2025



The forecast missed several peaks.

This configuration uses past counts. It does not test the benefit of weather.

Lessons from the Elja experiments

Small tests before long jobs

Check the script on a small sample.
Save models so the job can resume.

A simple baseline

Compare with the most common answer.
Check performance in every category.

Inputs available at prediction time

Injury records reveal the outcome.
They cannot support advance prediction.

A repeatable experiment

Keep the data split and settings.
Report limitations alongside results.

Collaboration and next steps

Explore the linked records on the map.

Test models on Elja and check every accident category.

Data partners

Met Office: review weather matches

Transport authorities: traffic and road data

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Questions welcome

Shared HPC workflow

Reusable scripts

Recorded settings



One dataset, two connected projects

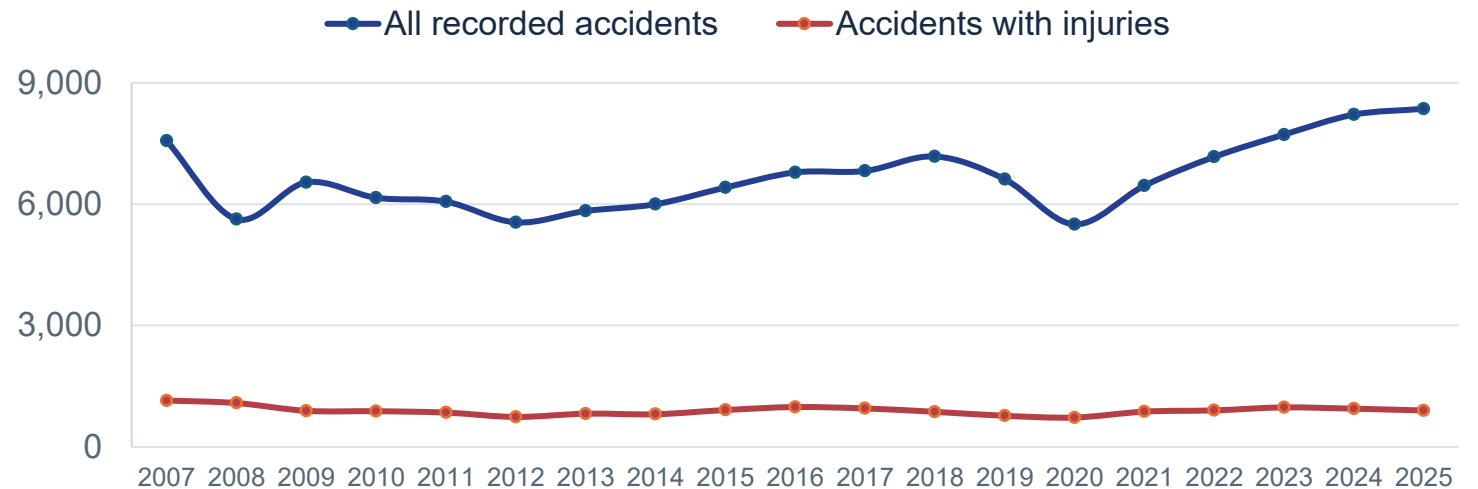
MSc thesis

Explore accidents with
nearby weather

HPC course

Test severity models and
forecast monthly counts

Recorded accidents in Iceland, 2007–2025



Counts show recorded events. Comparing risk also needs traffic volumes.

Today

Data and map

Elja experiments

Findings and next steps

What did the models try to predict?

Severity classification

Choose an accident category:
fatal, serious, minor injuries
or no injuries

AutoGluon and TabPFN

Inputs: weather, time information
and station distance

Monthly forecasting

Estimate future monthly totals
using earlier accident counts

Chronos-Bolt

A separate task using
monthly totals

Learning from older records, testing on later ones

Training: learn from examples

2007–2022

102,241 records

Testing: check the predictions

2023–2025

24,292 records

Model inputs

Weather, time information
and station distance

28 fatal accidents

Few fatal cases compared with
over 21,000 no-injury cases.

The model comparison gave similar scores

Method	Training records	Weighted F1
AutoGluon	102,241	0.8305
AutoGluon	10,000	0.8294
TabPFN	10,000	0.8292
Always predict “no injuries”	None	0.8292

All methods use the same 24,292 test records.

The majority-class reference makes the small improvement visible.

Feature availability changes the question

0.971

weighted F1 after adding
accident information

The strongest input counts
records in the injuries table.

Input	When it is known
Number of injury records	After the accident
Age in injury records	After the accident
Recorded accident type	After the accident

Advance prediction needs inputs available before the outcome.

Weather matching details

First displayed weather match	Distance
Median	2.22 km
Mean	3.45 km
Maximum observed	44.74 km

Three nearest eligible candidates

Ten-minute observations: ± 30 min
Hourly fallback: ± 60 min
No fixed distance cutoff

126,602 accidents have at least one match. Five have none.

Distance summary covers the nearest stored match per matched accident.

Severity confusion matrix

Actual class in rows. Predicted class in columns.

Actual / predicted	Fatal	Serious	Minor injuries	No injuries
Fatal (28)	0	0	2	26
Serious (531)	0	0	16	515
Minor injuries (2,265)	0	0	56	2,209
No injuries (21,468)	0	0	200	21,268

Weighted F1: 0.8305

Balanced accuracy: 0.2539

Modelling inputs and validation limits

Input family	Examples
Weather	Temperature, wind speed, gust and humidity
Derived fields	Freezing, rain, wind and missingness indicators
Time and station context	Hour, month, weekday, wind direction, distance

For a stricter rerun

Fit imputation on training data only.

Keep each weather value tied to its source station.

Exclude outcome-derived information from advance prediction.

Interpreting the forecast result

0.9482

Forecast absolute error divided by
historical seasonal absolute changes

monthly MASE

Weather columns

The plain Chronos-Bolt configuration
does not use the past weather inputs.

Next comparison

A weather-aware model and seasonal
baseline on the same held-out months.

Elja run and acknowledgements

```
[zaa2@elja-irhpc ~]$ sacct -j 1643554 --format=JobID,JobName,Account,Partition,NNodes,NCPUS,ReqMem,State,Elapsed,Submit,Start,End,ExitCode
JobID      JobName      Account      Partition    NNodes      NCPUS      ReqMem      State      Elapsed      Submit      Start      End      ExitCode
-----
1643554     crisp-dm     compsci-ui   Jotunn        1           32         128G      COMPLETED  04:26:55  2026-04-26T13:14:11 2026-04-26T13:14:12 2026-04-26T17:41:07 0:0
1643554.bat+ batch     compsci-ui           1           32         COMPLETED  04:26:55  2026-04-26T13:14:12 2026-04-26T13:14:12 2026-04-26T17:41:07 0:0
1643554.ext+ extern     compsci-ui           1           32         COMPLETED  04:26:55  2026-04-26T13:14:12 2026-04-26T13:14:12 2026-04-26T17:41:07 0:0
1643554.0    python     compsci-ui           1           32         COMPLETED  04:26:55  2026-04-26T13:14:12 2026-04-26T13:14:12 2026-04-26T17:41:07 0:0
[zaa2@elja-irhpc ~]$
```

MSc supervision

Kristján Jónasson
Ebba Þóra Hvannberg

Data and computing

Samgöngustofa and Veðurstofa Íslands
University of Iceland, Elja
TÖL025M HPC course