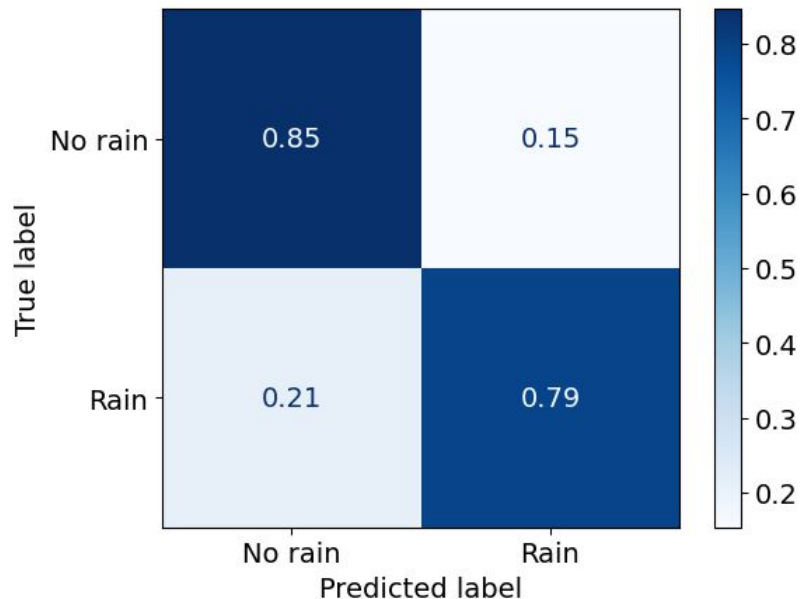
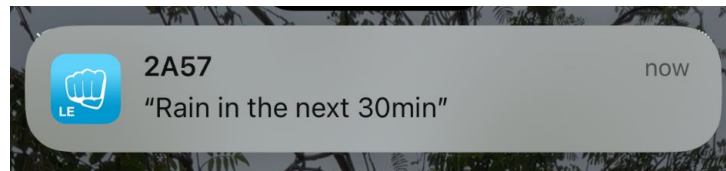


Weather Patrol

Aditya Krishna & Pujan Patel



Background + Dataset

- Seattle weather can be unpredictable!

From July 1999, the UW Atmospheric Sciences department began collecting weather data.



The UW Atmospheric Sciences Building Weather Station that is monitoring and transmitting data to a web portal

Background + Dataset

- Seattle weather can be unpredictable!

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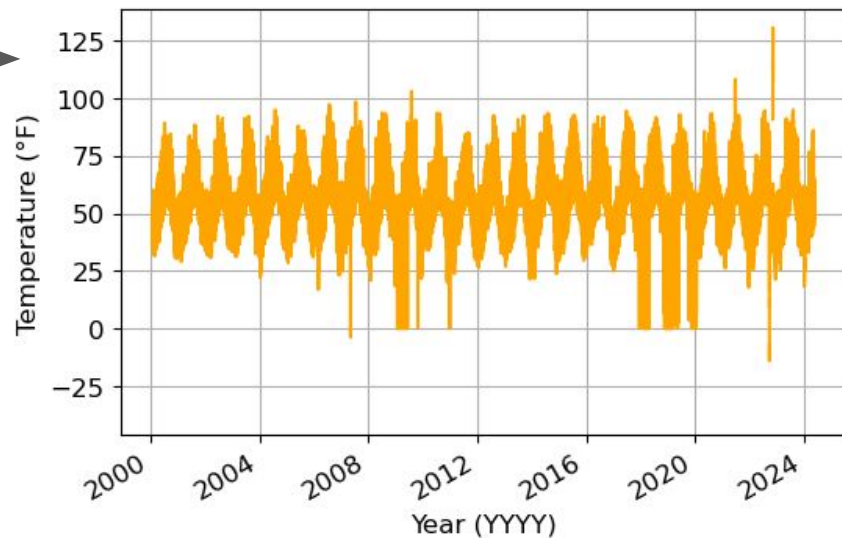


The UW Atmospheric Sciences Building Weather Station that is monitoring and transmitting data to a web portal

Measurements:

- Were collected every minute
- Included several environmental variables and rain

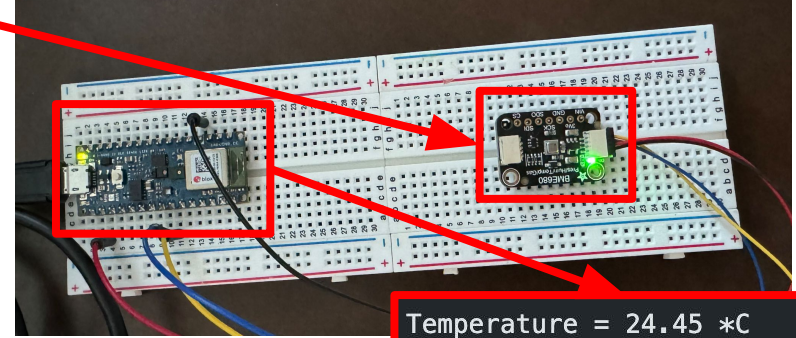
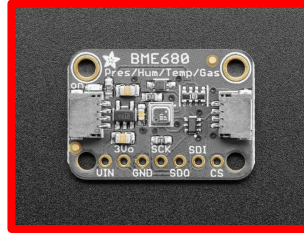
Temperature measurements →



Selected features: month, temp., pressure, rel. humidity

Criteria:

- Availability
 - BME680 sensor
 - Reads temp., pressure, and humidity.

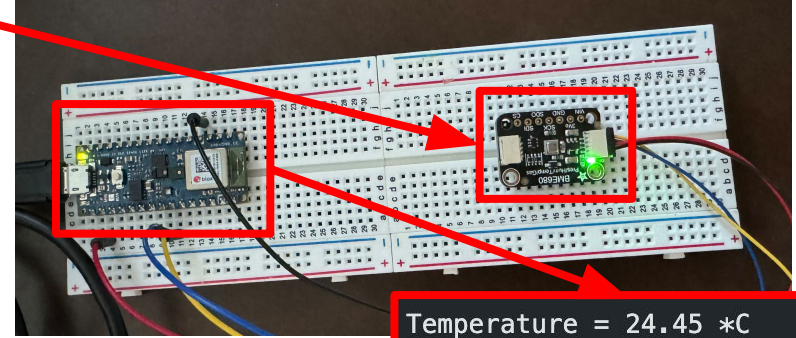
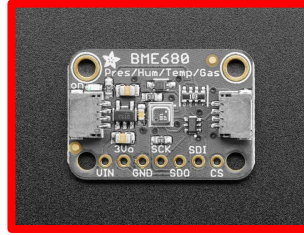


Temperature = 24.45 *C
Pressure = 1002.59 hPa
Humidity = 62.69 %
Gas = 22.57 KOHms
Approx. Altitude = 89.05 m

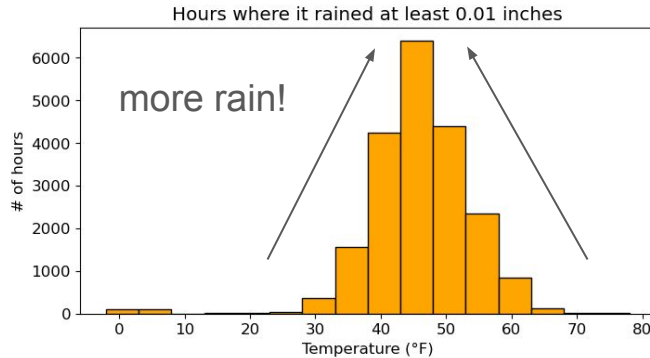
Selected features: month, temp., pressure, rel. humidity

Criteria:

- Availability
 - BME680 sensor
 - Reads temp., pressure, and humidity.
- Importance towards rain



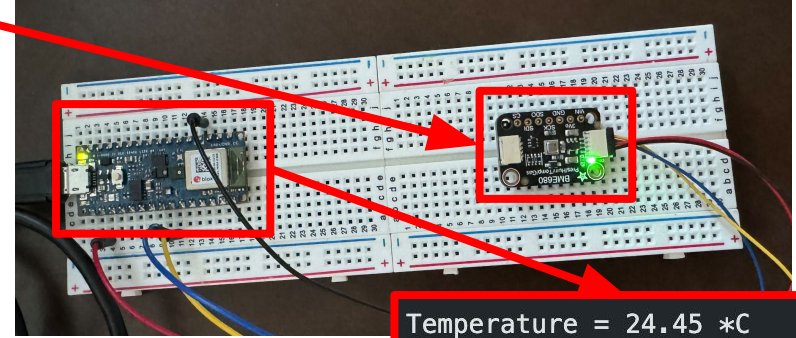
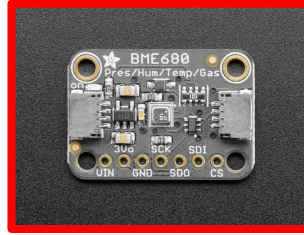
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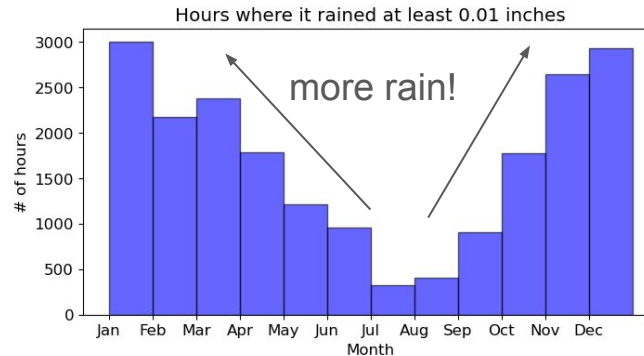
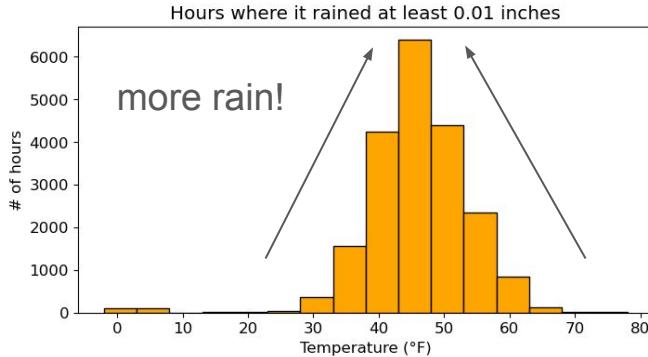
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Approx. Altitude = 89.05 m



Data Pre-Processing

Initial Steps:

- Removed missing (M)
- Selected from 2022 →
- Serialized Rain
- Normalized the values for ML
- 60/20/20 split (train/val/test)

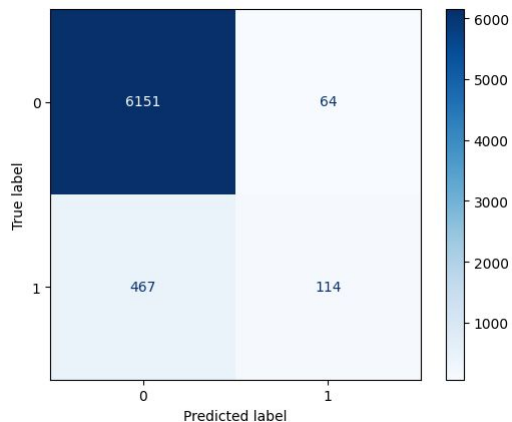
Intermediary

	month	temperature	relhum	pressure	class
0	5	44.4	88.5	1014.6	0.0
1	7	61.2	72.5	1023.6	0.0
2	11	59.9	97.2	1001.6	0.0
3	12	43.8	85.1	1002.9	0.0
4	12	50.0	75.8	996.0	0.0

Final

	n_month	n_temp	n_relhum	n_press	p_norain	p_rain
0	-1.349449	0.063454	1.185632	0.399001	0.0	1.0
1	-0.812923	-1.220894	0.592793	-1.657773	0.0	1.0
2	-0.276397	0.177618	0.335297	0.286813	0.0	1.0
3	1.601444	-0.726182	1.095808	0.386535	0.0	1.0
4	-1.081186	-1.677551	1.155690	-1.732565	0.0	1.0

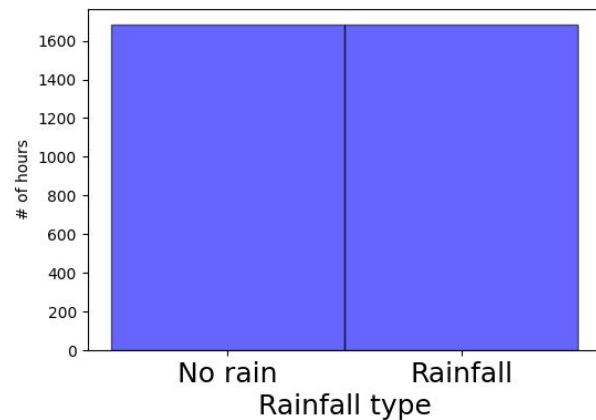
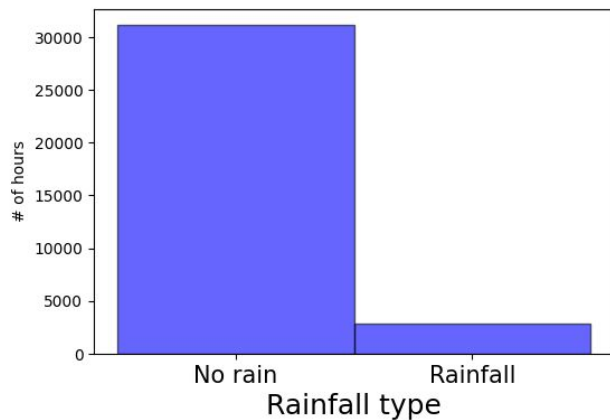
Data Pre-Processing



Training
Accuracy: 93%

Sampling

- SMOTE
- Oversampling w/ Noise
- Undersampling



Model Architecture

Model: "sequential_2"

Layer (type)	Output Shape	Param #
Input (Dense)	(None, 4)	20
dense_6 (Dense)	(None, 128)	640
dense_7 (Dense)	(None, 128)	16,512
dense_8 (Dense)	(None, 64)	8,256
dropout_1 (Dropout)	(None, 64)	0
Output (Dense)	(None, 2)	130

4 Inputs:

Month, Temperature,
Humidity, Pressure

Total params: 76,676 (299.52 KB)

Trainable params: 25,558 (99.84 KB)

Non-trainable params: 0 (0.00 B)

Optimizer params: 51,118 (199.68 KB)

2 Classifications:

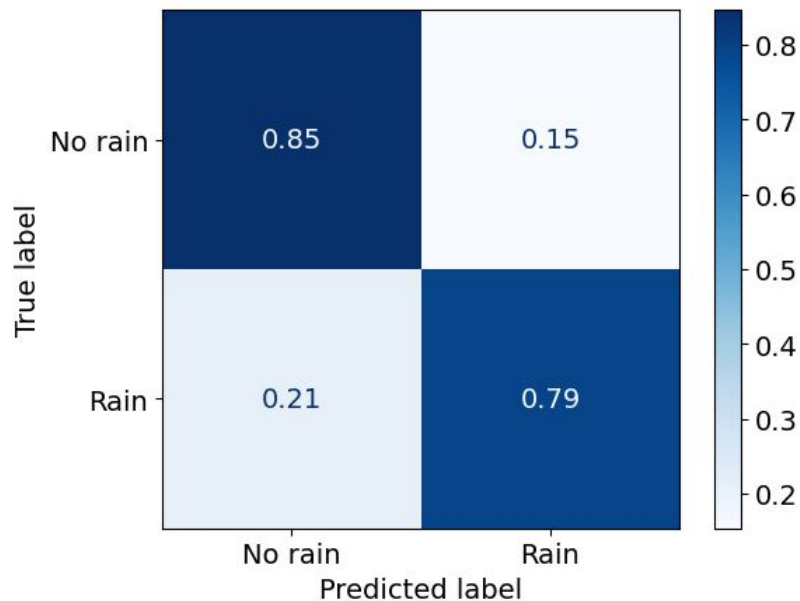
No Rain, Rain

~600 KB

Experimental Results

2-class model (60 epochs min. + LR:0.001)

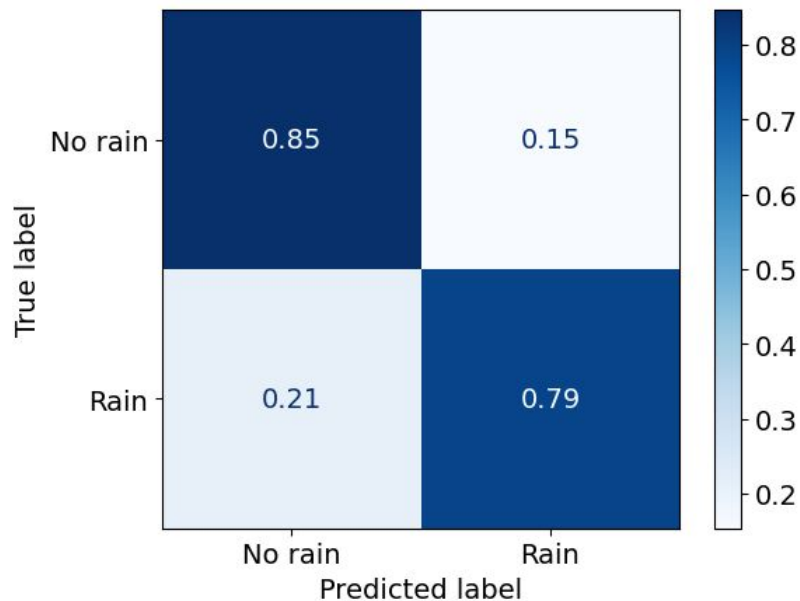
- F-1 scores: No rain: 0.823, Rain: 0.813



Experimental Results

2-class model (60 epochs min. + LR:0.001)

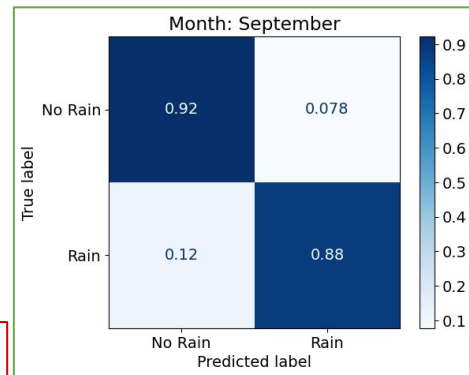
- F-1 scores: No rain: 0.823, Rain: 0.813



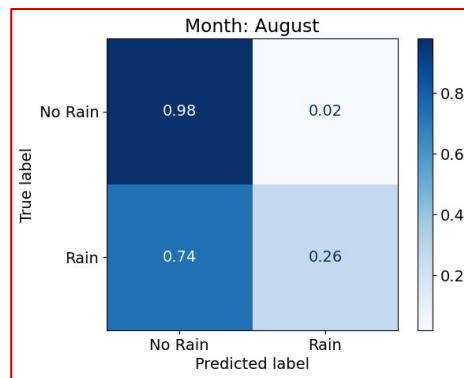
Analysis (Month-specific)

F-1 scores: No rain: 0.903, Rain: 0.899

Good!



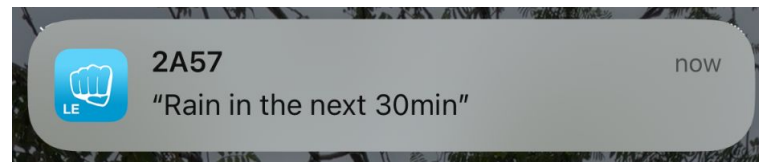
Bad!



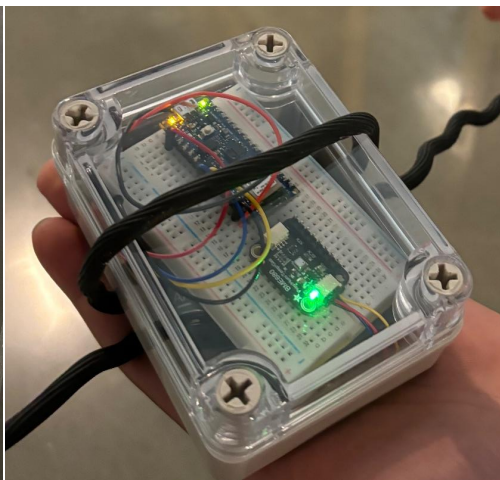
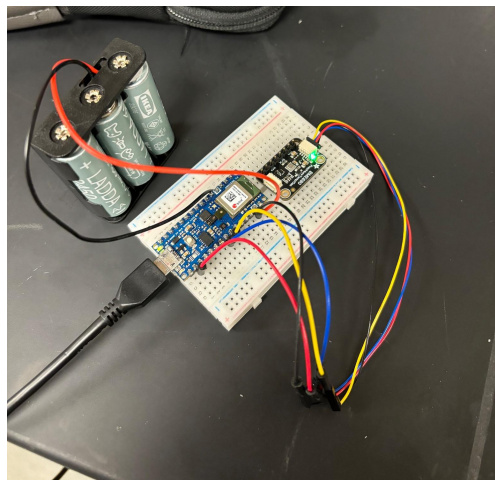
F-1 scores: No rain: 0.721, Rain: 0.41

Deployment!

- Deployment materials:
 - Rubber Cord
 - Rechargeable batteries
 - Waterproof container
 - LightBlue app from App Store!



- Get BLE notifications to your phone!
- Below we deployed on tree!



Q&A Session



THANK YOU!

