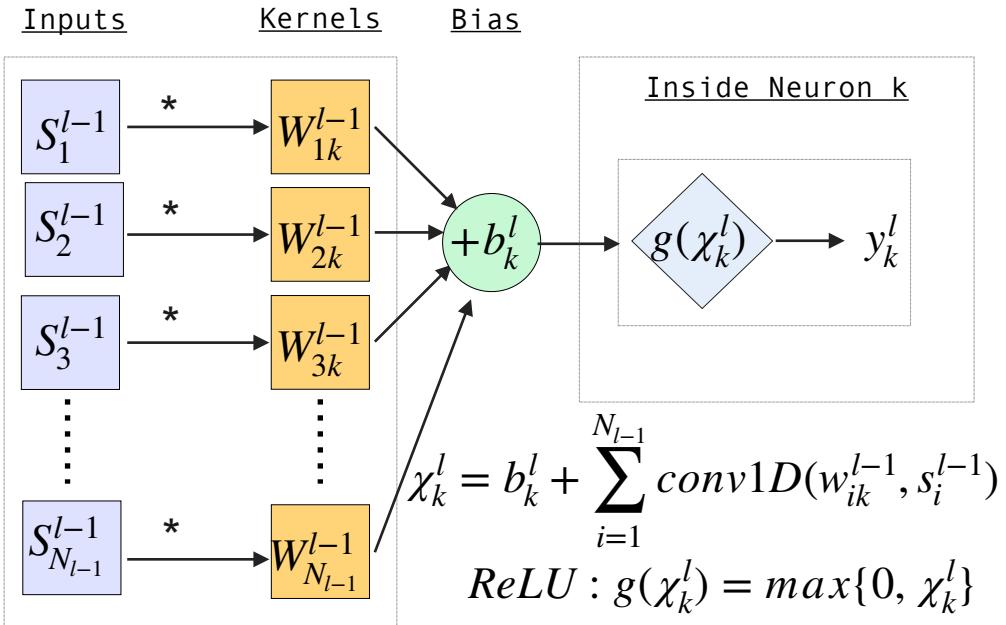


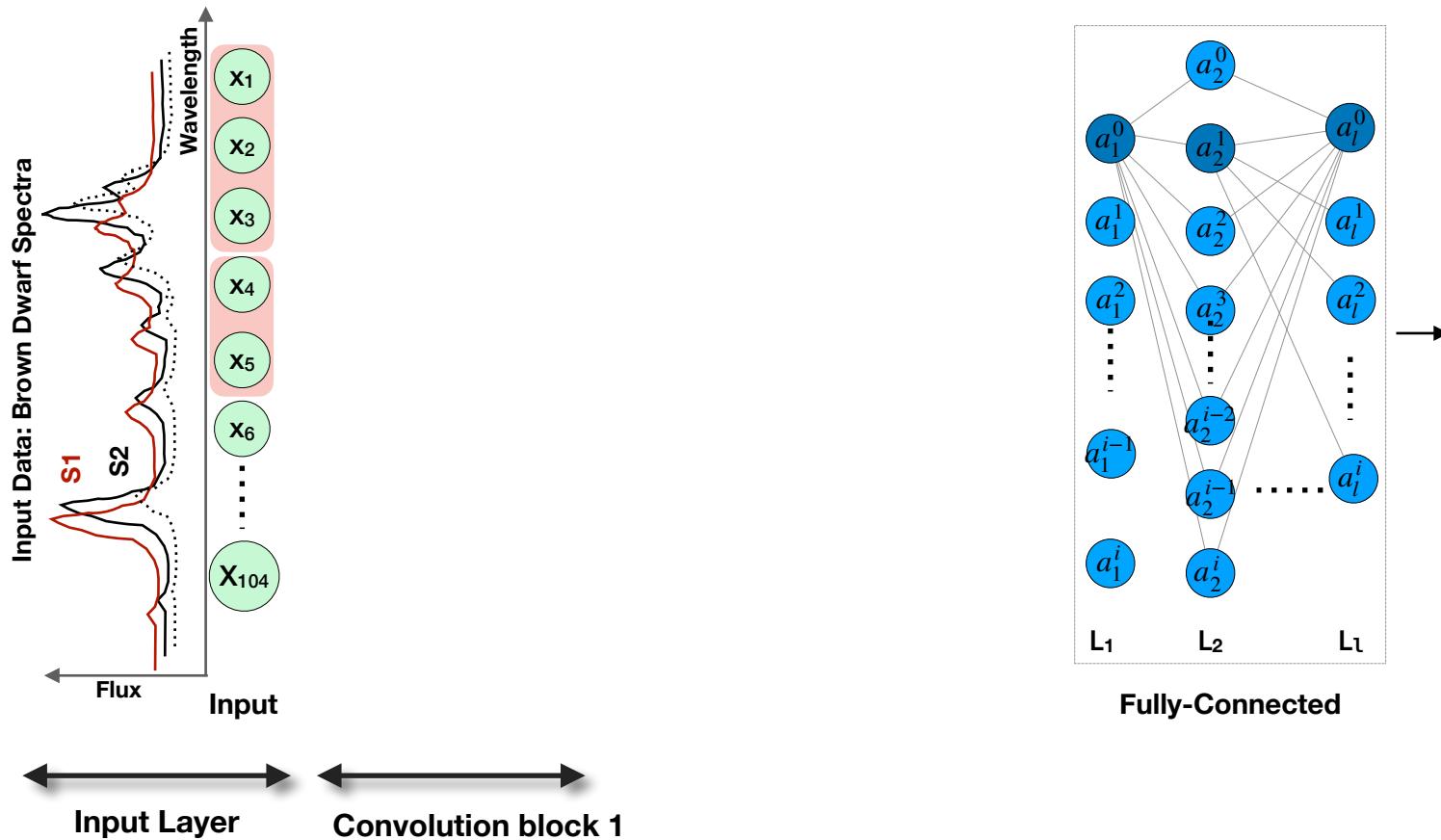
TelescopeML

Conv1D layer l-1

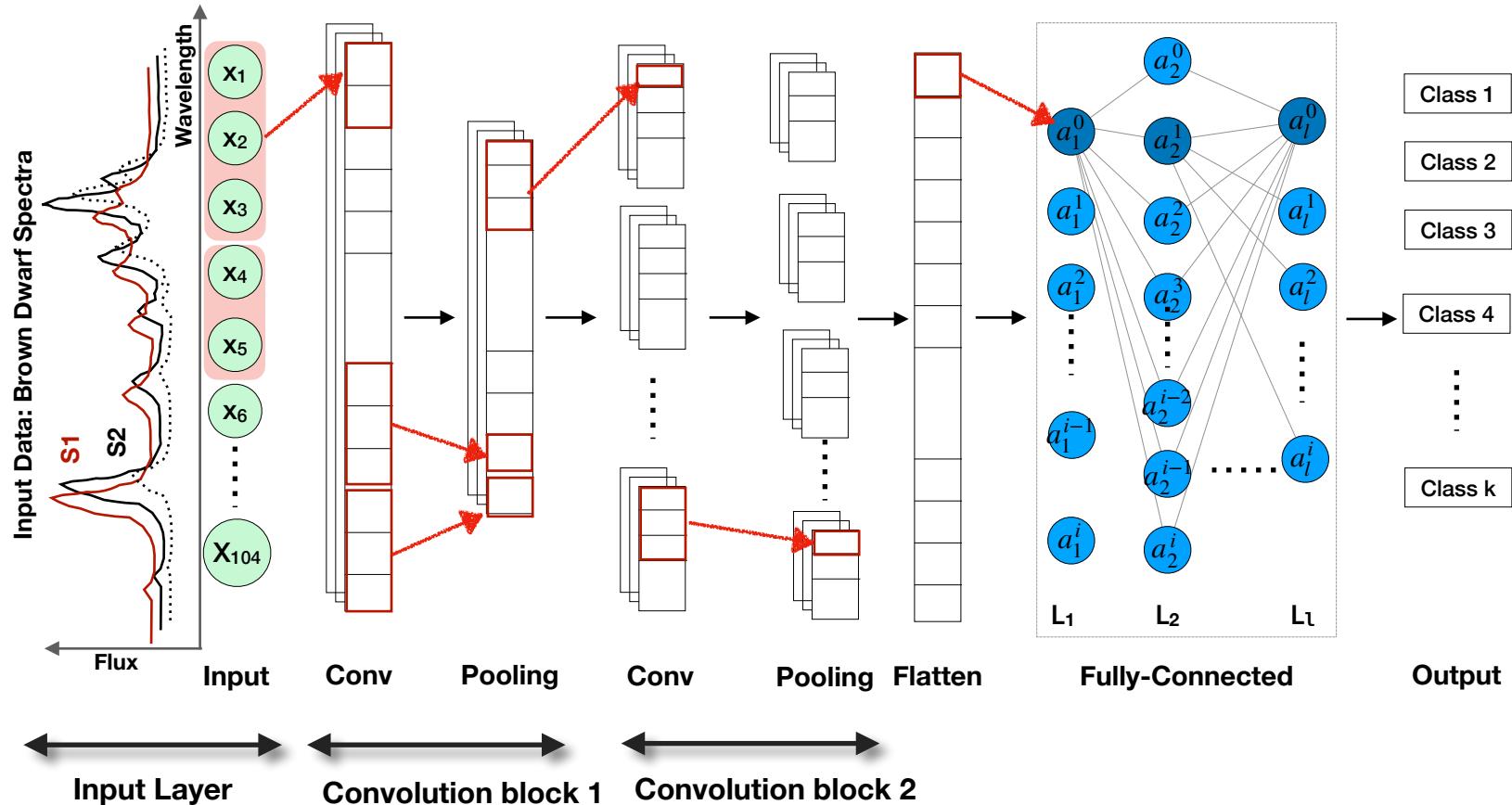
Conv1D layer l

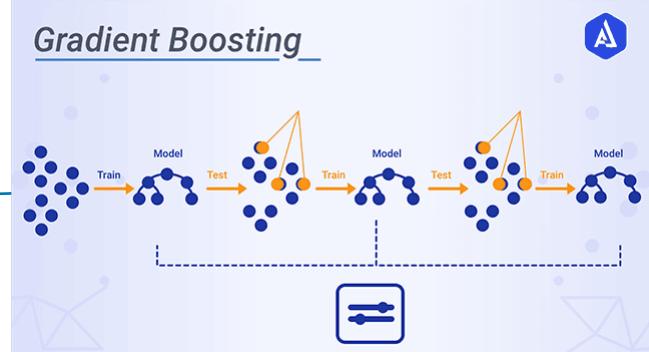
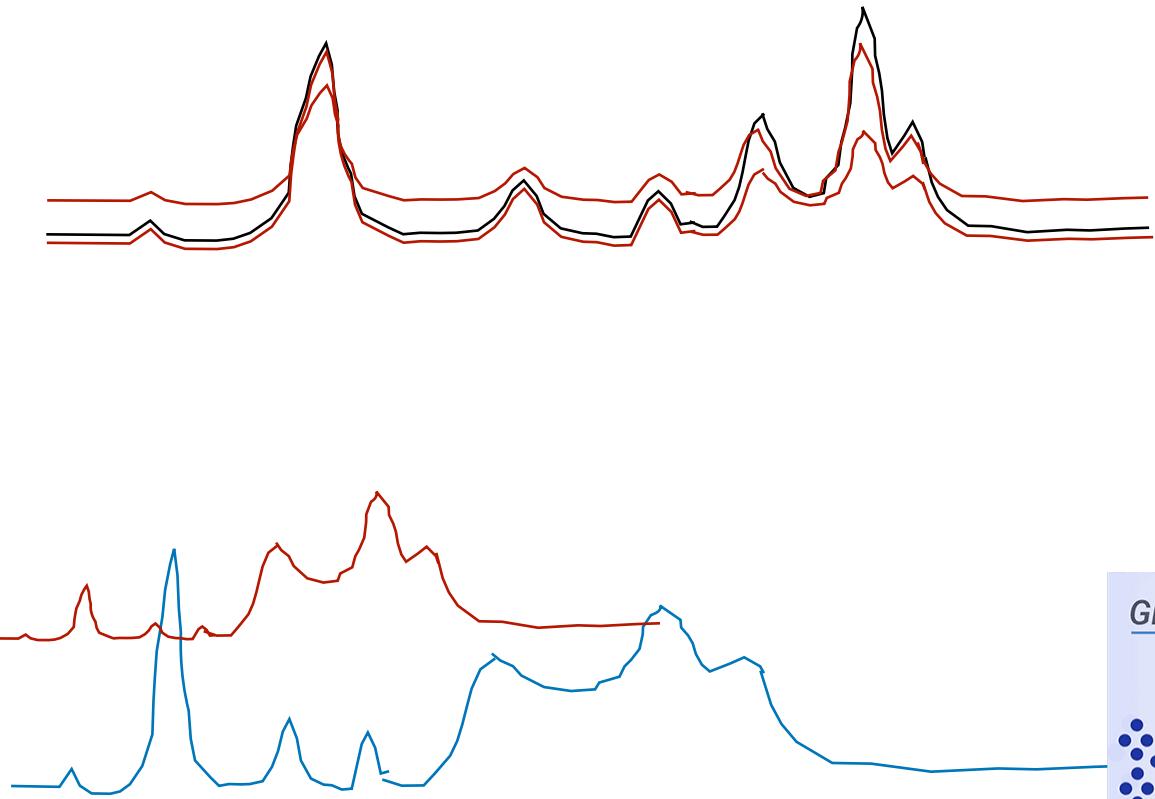


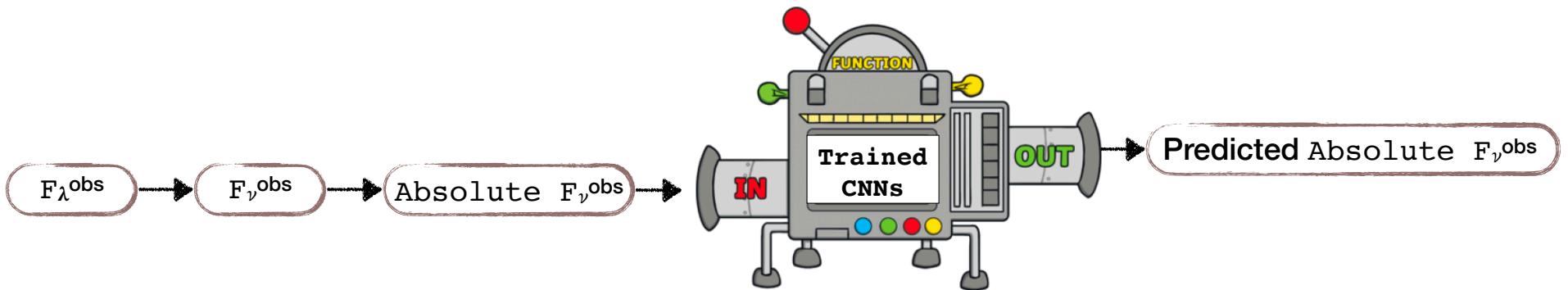
1D Convolutional Neural Networks: Main Architecture



Convolution Neural Network Main Architecture

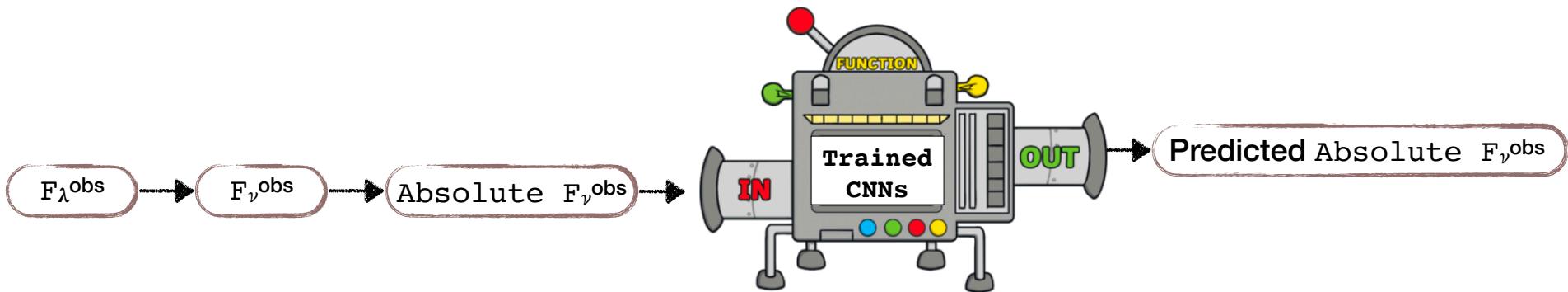






`predict.obs_data_df`

	wl	F_lambda	F_lambda_error	F_lambda_obs	F_lambda_obs_err	Fnu_obs	Fnu_obs_err	Fnu_obs_absolute	Fnu_obs_absolute_err
0	0.650857	8.606238e-17	4.358173e-17	8.606238e-17	4.358173e-17	1.216085e-27	6.158216e-28	4.280381e-08	2.167572e-08
1	0.653073	1.771977e-17	3.360256e-17	1.771977e-17	3.360256e-17	2.520930e-28	4.780520e-28	8.873182e-09	1.682650e-08
2	0.655278	7.300979e-17	3.132892e-17	7.300979e-17	3.132892e-17	1.045711e-27	4.487205e-28	3.680698e-08	1.579409e-08
3	0.657472	2.569511e-17	2.837585e-17	2.569511e-17	2.837585e-17	3.704967e-28	4.091501e-28	1.304076e-08	1.440129e-08
4	0.659659	3.786160e-18	2.497690e-17	3.786160e-18	2.497690e-17	5.495628e-29	3.625408e-28	1.934354e-09	1.276073e-08
...
559	2.550960	6.071953e-18	3.190524e-17	6.071953e-18	3.190524e-17	1.317999e-27	6.925460e-27	4.639099e-08	2.437627e-07
560	2.553900	-5.264509e-17	3.022278e-17	1.090368e-17	3.022278e-17	2.372248e-27	6.575390e-27	8.349851e-08	2.314409e-07
561	2.556850	1.573540e-17	2.389914e-17	1.573540e-17	2.389914e-17	3.431371e-27	5.211612e-27	1.207776e-07	1.834386e-07
562	2.559820	-1.8666872e-18	1.702191e-17	1.129194e-17	1.702191e-17	2.468123e-27	3.720545e-27	8.687311e-08	1.309559e-07
563	2.562800	6.848479e-18	1.581222e-17	6.848479e-18	1.581222e-17	1.500386e-27	3.464188e-27	5.281065e-08	1.219327e-07



```
predict.obs_data_df
```

	wl	F_lambda	F_lambda_error	F_lambda_obs	F_lambda_obs_err	Fnu_obs	Fnu_obs_err	Fnu_obs_absolute	Fnu_obs_absolute_err
0	0.650857	8.606238e-17	4.358173e-17	8.606238e-17	4.358173e-17	1.216085e-27	6.158216e-28	4.280381e-08	2.167572e-08
1	0.653073	1.771977e-17	3.360256e-17	1.771977e-17	3.360256e-17	2.520930e-28	4.780520e-28	8.873182e-09	1.682650e-08
2	0.655278	7.300979e-17	3.132892e-17	7.300979e-17	3.132892e-17	1.045711e-27	4.487205e-28	3.680698e-08	1.579409e-08
3	0.657472	2.569511e-17	2.837585e-17	2.569511e-17	2.837585e-17	3.704967e-28	4.091501e-28	1.304076e-08	1.440129e-08

```

import astropy.units as u
fnu = ( predict.obs_data_df.F_lambda.values * u.erg / u.s / u.Angstrom / u.cm**2 ).to(
    u.erg / u.s / u.cm**2 / u.Hz, equivalencies = u.spectral_density( predict.obs_data_df.wl.values * u.micron ) )

fnu
[1.2160846 × 10-27, 2.5209302 × 10-28, 1.0457107 × 10-27, ..., 3.4313713 × 10-27, -4.0804927 × 10-28, 1.5003856 × 10-27]  $\frac{\text{erg}}{\text{Hz s cm}^2}$ 

Fnu_values_abs = fnu * (brown_dwarf_literature_info['bd_distance_pc'] * ((u.pc).to(u.jupiterRad)) / (
    brown_dwarf_literature_info['bd_radius_Rjup'])) ** 2

# Fnu_errors_abs = Fnu_errors * (
#     bd_literature_dic['bd_distance_pc'] * ((u.pc).to(u.jupiterRad)) / (
#         bd_literature_dic['bd_radius_Rjup'])) ** 2
Fnu_values_abs
[4.2803806 × 10-8, 8.8731823 × 10-9, 3.6806977 × 10-8, ..., 1.2077757 × 10-7, -1.4362538 × 10-8, 5.2810645 × 10-8]  $\frac{\text{erg}}{\text{Hz s cm}^2}$ 

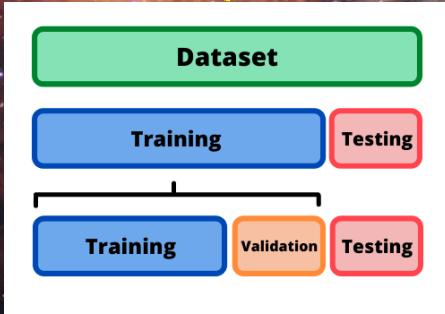
```



Build

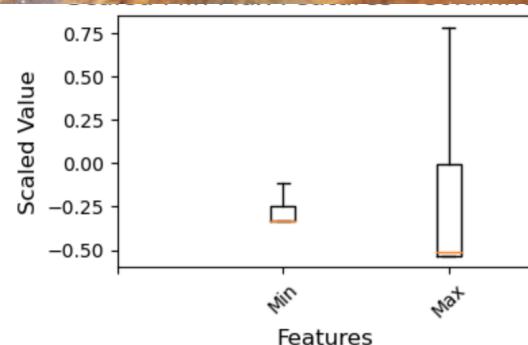
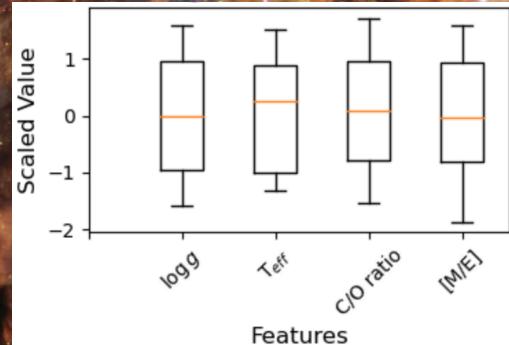
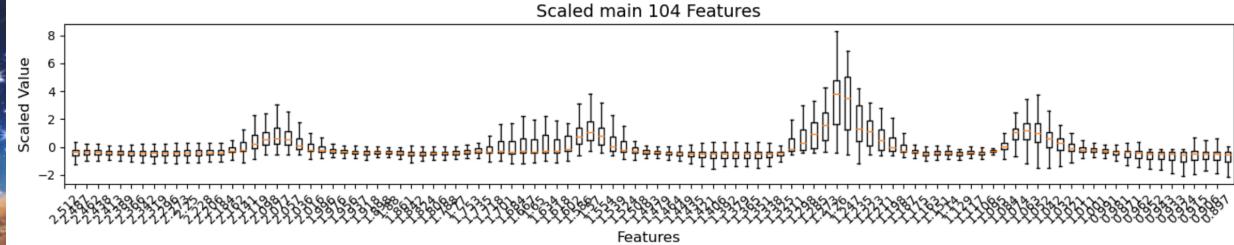
TelescopeML.DeepRegBuilder

1 Split dataset



②

Data Processing



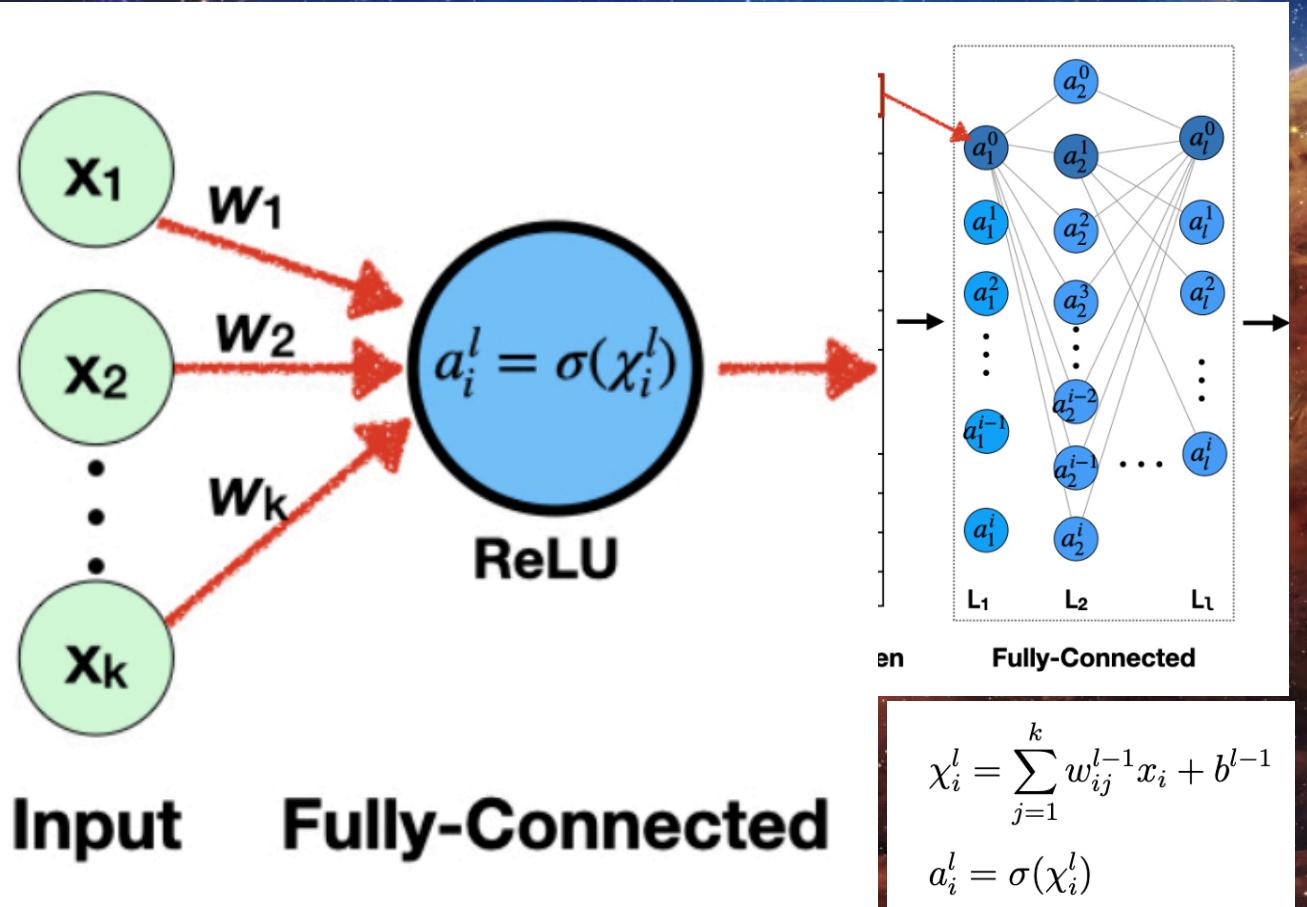


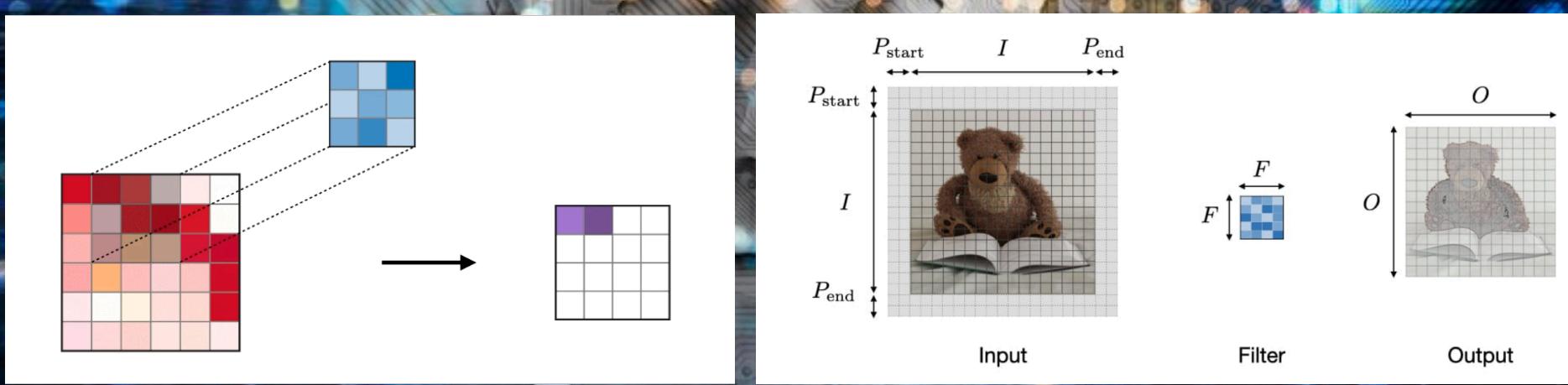
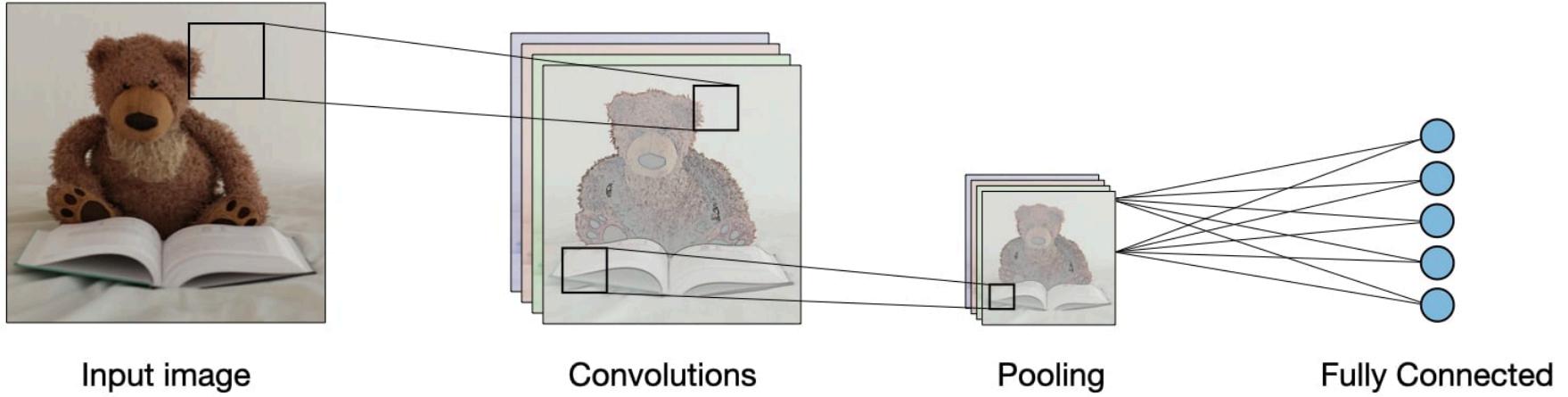
Train

TelescopeML.DeepRegTrainer



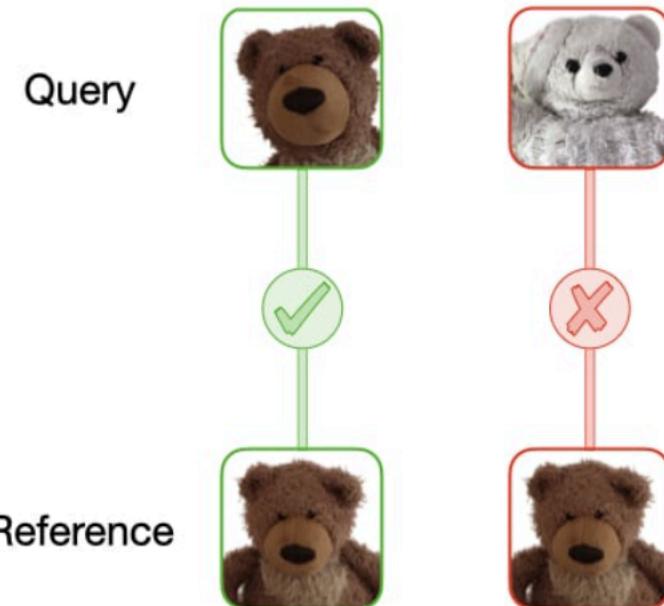
Input





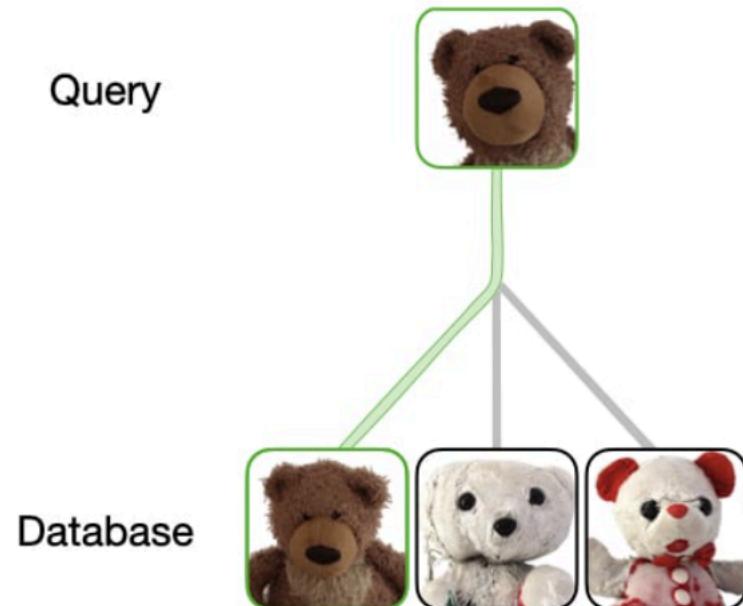
Face verification

- Is this the correct person?
- One-to-one lookup

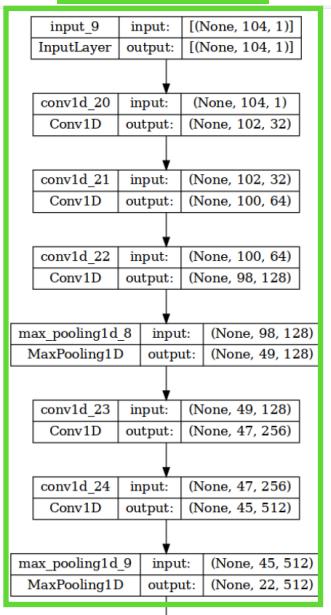


Face recognition

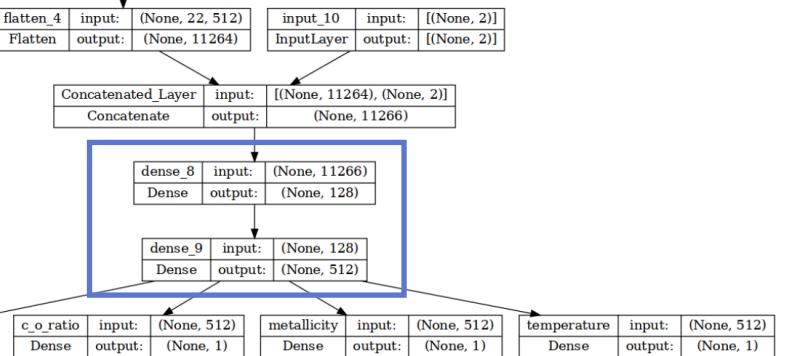
- Is this one of the K persons in the database?
- One-to-many lookup



Convolutional Neural Networks



Engineered Features

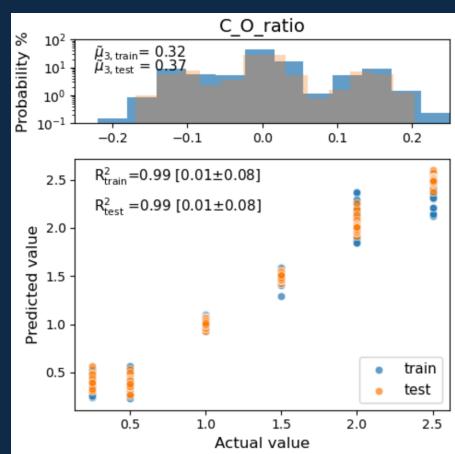
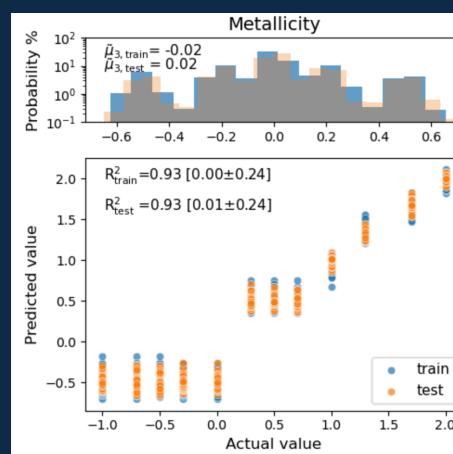
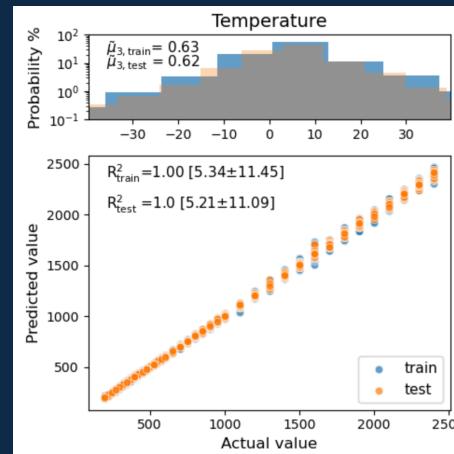
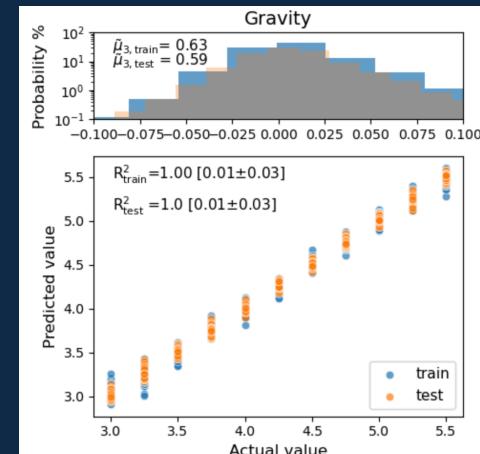
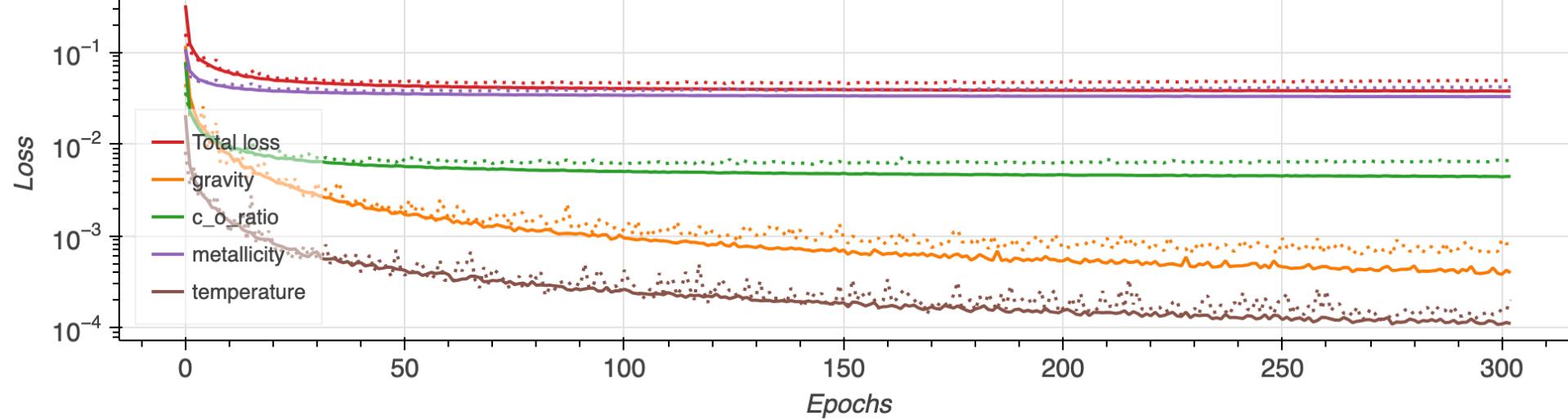


Layer (type)	Output Shape	Param #	Connected
input_9 (InputLayer)	[(None, 104, 1)]	0	
conv1d_20 (Conv1D)	(None, 102, 32)	128	input_9[0]
conv1d_21 (Conv1D)	(None, 100, 64)	6208	conv1d_20[0]
conv1d_22 (Conv1D)	(None, 98, 128)	24704	conv1d_21[0]
max_pooling1d_8 (MaxPooling1D)	(None, 49, 128)	0	conv1d_22[0]
conv1d_23 (Conv1D)	(None, 47, 256)	98560	max_pooling1d_8[0]
conv1d_24 (Conv1D)	(None, 45, 512)	393728	conv1d_23[0]
max_pooling1d_9 (MaxPooling1D)	(None, 22, 512)	0	conv1d_24[0]
flatten_4 (Flatten)	(None, 11264)	0	max_pooling1d_9[0]
input_10 (InputLayer)	[(None, 2)]	0	
Concatenated_Layer (Concatenate (None, 11266))	0		flatten_4[0], input_10[0]
dense_8 (Dense)	(None, 128)	1442176	Concatenated_Layer[0]
dense_9 (Dense)	(None, 512)	66048	dense_8[0]
gravity (Dense)	(None, 1)	513	dense_9[0]
c_o_ratio (Dense)	(None, 1)	513	dense_9[0]
metallicity (Dense)	(None, 1)	513	dense_9[0]
temperature (Dense)	(None, 1)	513	dense_9[0]

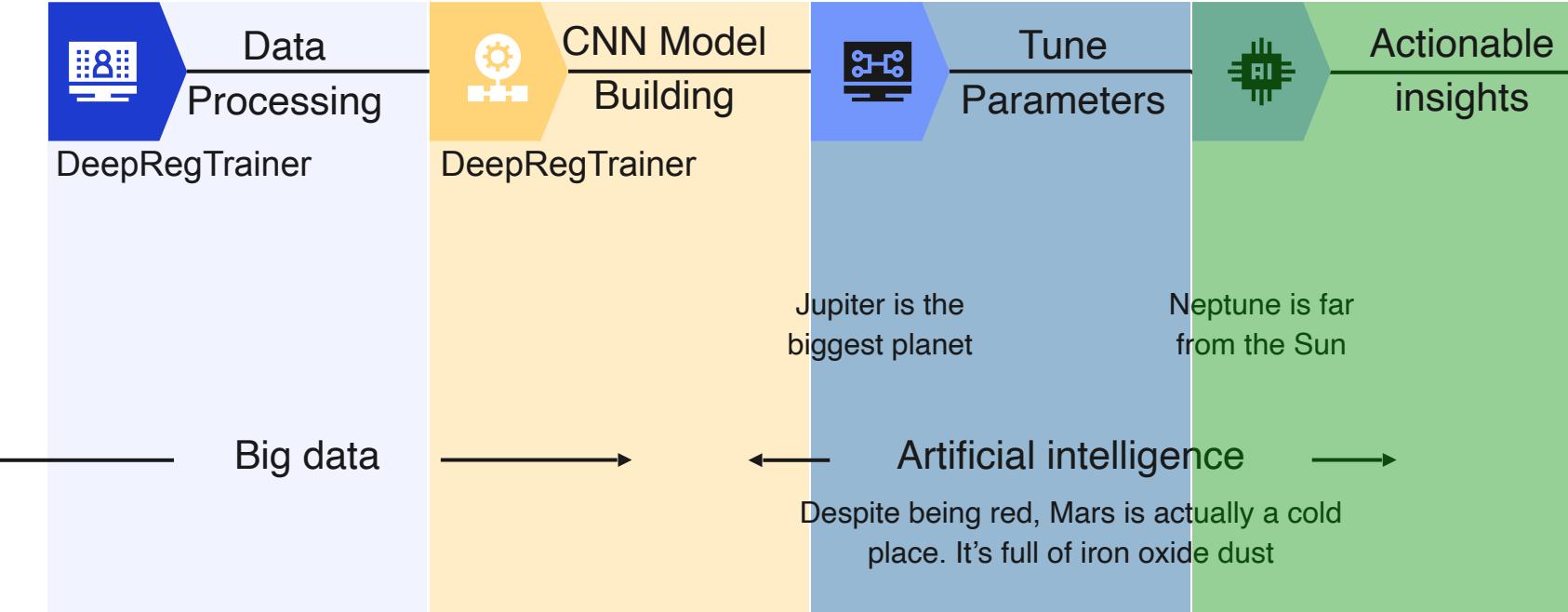
Total params: 2,033,604

Trainable params: 2,033,604

Non-trainable params: 0



TelescopeML



Earth is the third planet from the Sun and the only one that harbors life

Artificial Intelligence Infographics



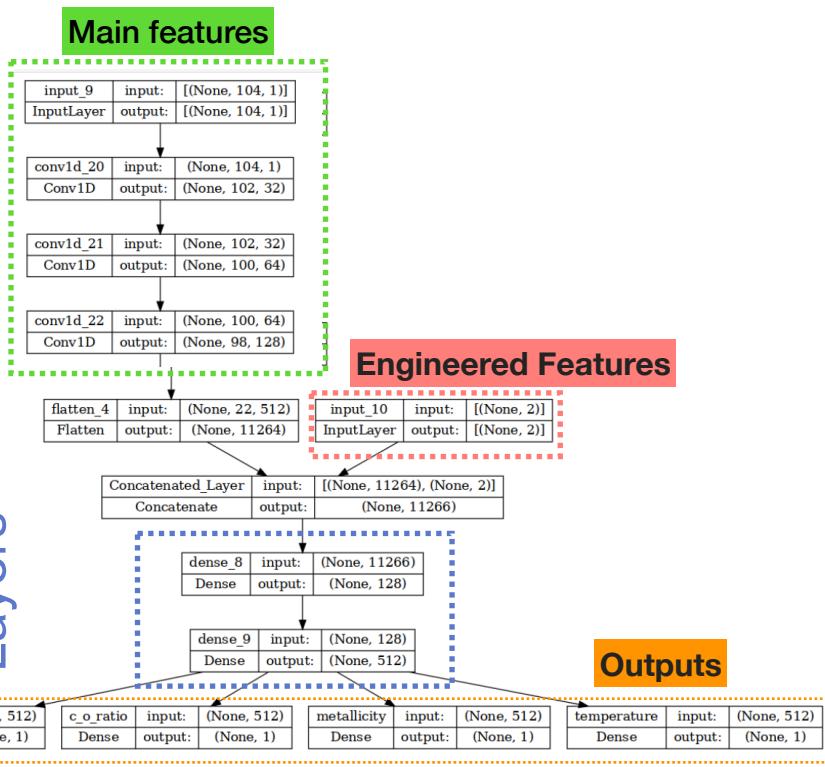
Infographics

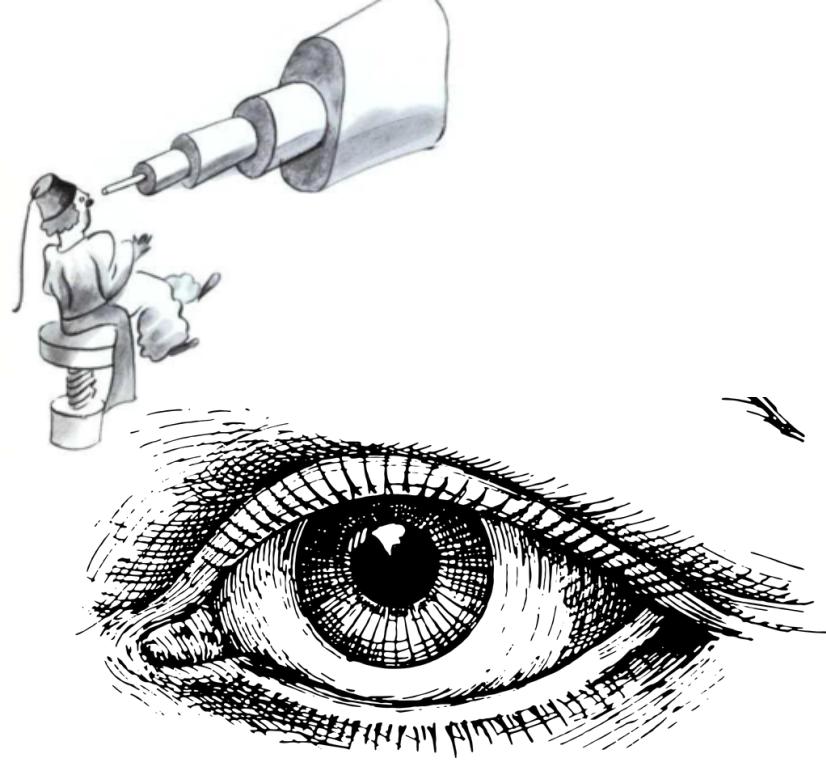
You can add and edit some infographics to your presentation to present your data in a visual way.

- Choose your favourite infographic and insert it in your presentation using Ctrl C + Ctrl V or Cmd C + Cmd V in Mac.
- Select one of the parts and **ungroup** it by right-clicking and choosing “Ungroup”.
- **Change the color** by clicking on the paint bucket.
- Then **resize** the element by clicking and dragging one of the square-shaped points of its bounding box (the cursor should look like a double-headed arrow). Remember to hold Shift while dragging to keep the proportions.
- **Group** the elements again by selecting them, right-clicking and choosing “Group”.
- Repeat the steps above with the other parts and when you’re done editing, copy the end result and paste it into your presentation.
- Remember to choose the “**Keep source formatting**” option so that it keeps the design. For more info, please visit [our blog](#).



FC
Layers





TelescopeML



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