

# Regensburg Pediatric Appendicitis

- **Background**

Appendicitis is the inflammation of the appendix. This can be a sharp pain in the lower right abdomen, with the appendix being inflamed and filled with pus. The appendix is important in gut health because it maintains healthy gut bacteria and helps fight good bacteria. Usually, this is caused by infections or parasites in your digestion system and the tube leading to the appendix can be blocked by stool and/or mucus. If it is not treated promptly, appendicitis in kids can quickly cause a ruptured appendix which spreads infection throughout the abdominal cavity (known as peritonitis), leading to sepsis which is a fatal condition that might increase mortality rates.[1]

- **Objective**

My objective is to use pediatric patient data to predict whether a child has or not. I will do this by using their lab work and excluding their general demographics such as gender or height.

Task Type

This would be a classification problem because the goal is to determine if a child has appendicitis or not.

- **Target Variable**

The target variable used in my analysis is the diagnosis. The patients were triaged and eventually diagnosed .

- **Dataset overview**

- **Instances: 782**
- **Number of Features: 19**
- *My dataset originally included 56 features, but I removed all the demographics and only focused on the lab data from patients.*

The dataset was sourced from a cohort of pediatric patients admitted with abdominal pain to Children's Hospital St. Hedwig in Regensburg, Germany. The data was collected from 2016-2021 and comprises the patient's labs, demographics, scans, and symptoms.

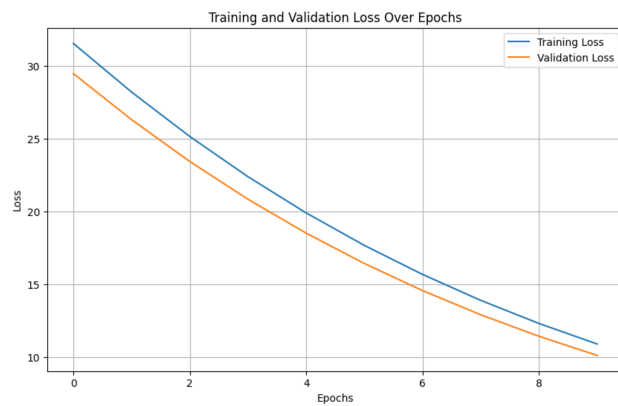
## DNN Models

### Train Validation Curve

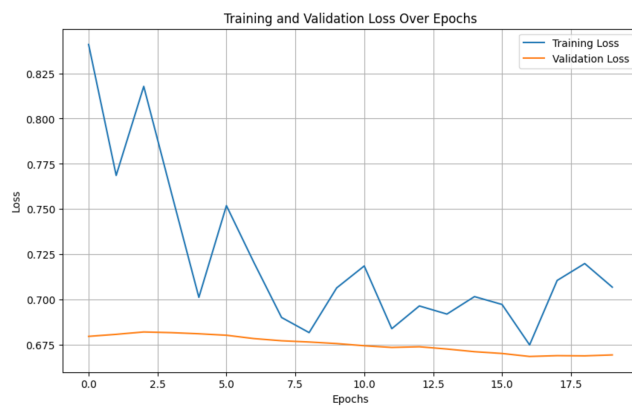
*BaseModel*



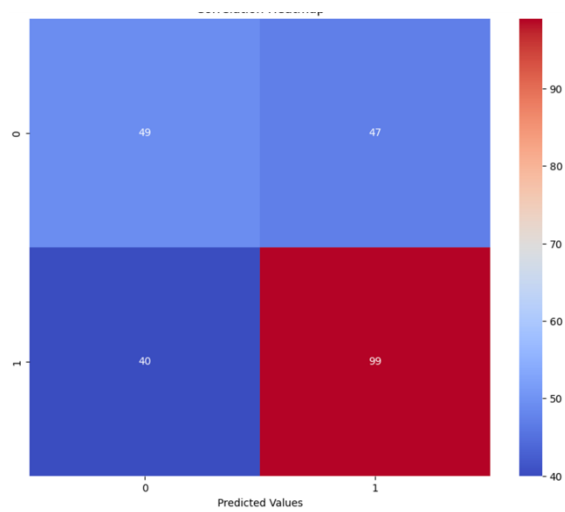
## Regularization



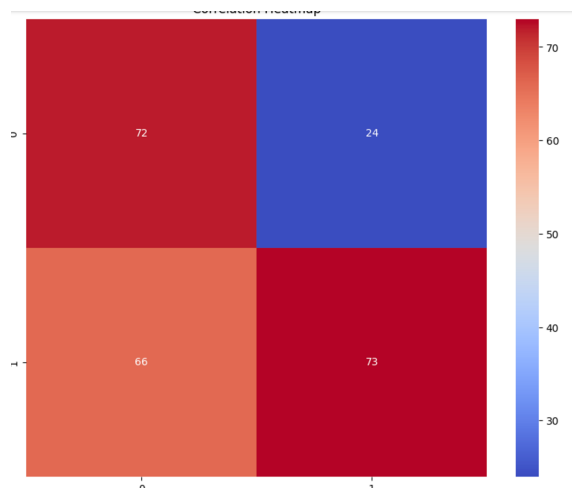
## Dropout



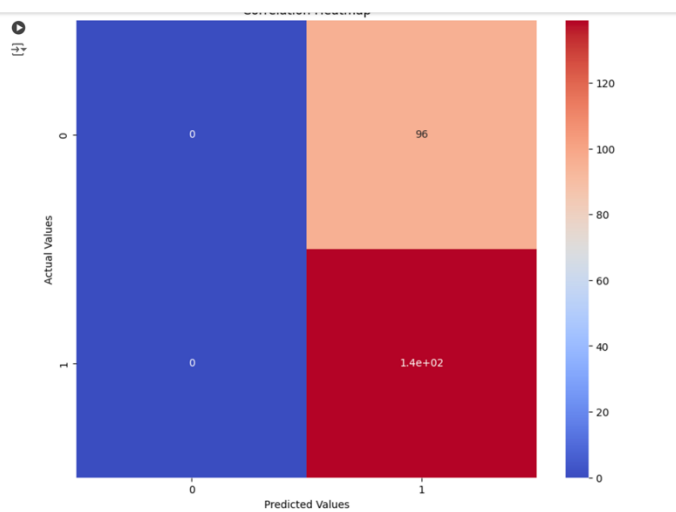
## Confusion Matrix (Test Sets) Base Model



## Regularization



## Drop Out



Evaluation Results

Train	Accuracy	Sensitivity	Specificity	F1 Score	Precision
Base Model	0.94	0.94	0.94	0.99	1.00
Tuned Model 1	0.87	0.78	0.78	0.87	1.00
Tuned Model 2	0.59	1.00	1.00	0.74	0.59

Test	Accuracy	Sensitivity	Specificity	F1 Score	Precision
Base Model	0.987	0.71	0.71	0.69	0.68
Tuned Model 1	0.59	1.00	1.00	0.74	0.59
Tuned Model 2	0.59	1.00	1.00	0.74	0.59

Validation	Accuracy	Sensitivity	Specificity	F1 Score	Precision
Base Model	0.69	0.80	0.80	0.69	0.71
Tuned Model 1	0.62	0.51	0.51	0.61	0.76
Tuned Model 2	0.59	1.00	1.00	0.74	0.59

Model Summary

Base

Model: "sequential"

Layer (type)	Output Shape	Param #
dense (Dense)	(None, 64)	4,544
dense_1 (Dense)	(None, 64)	4,160
dense_2 (Dense)	(None, 64)	4,160
dense_3 (Dense)	(None, 64)	4,160
dense_4 (Dense)	(None, 64)	4,160
dense_5 (Dense)	(None, 1)	65

Total params: 63,749 (249.02 KB)  
Trainable params: 21,249 (83.00 KB)  
Non-trainable params: 0 (0.00 B)  
Optimizer params: 42,500 (166.02 KB)

Regularization

Base Model Summary:  
Model: "sequential"

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dense (Dense)	(None, 64)	4,544
dense_1 (Dense)	(None, 64)	4,160
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dense_4 (Dense)	(None, 64)	4,160
dense_5 (Dense)	(None, 1)	65

Total params: 63,749 (249.02 KB)  
Trainable params: 21,249 (83.00 KB)  
Non-trainable params: 0 (0.00 B)  
Optimizer params: 42,500 (166.02 KB)

# Drop

Model: "sequential\_2"

Layer (type)	Output Shape	Param #
dense_12 (Dense)	(None, 70)	4,970
dropout_10 (Dropout)	(None, 70)	0
dense_13 (Dense)	(None, 70)	4,970
dropout_11 (Dropout)	(None, 70)	0
dense_14 (Dense)	(None, 70)	4,970
dropout_12 (Dropout)	(None, 70)	0
dense_15 (Dense)	(None, 70)	4,970
dropout_13 (Dropout)	(None, 70)	0
dense_16 (Dense)	(None, 70)	4,970
dropout_14 (Dropout)	(None, 70)	0
dense_17 (Dense)	(None, 70)	4,970
dropout_15 (Dropout)	(None, 70)	0
dense_18 (Dense)	(None, 70)	4,970
dropout_16 (Dropout)	(None, 70)	0
dense_19 (Dense)	(None, 70)	4,970
dropout_17 (Dropout)	(None, 70)	0
dense_20 (Dense)	(None, 70)	4,970
dropout_18 (Dropout)	(None, 70)	0
dense_21 (Dense)	(None, 1)	71

Total params: 134,405 (525.02 KB)  
Trainable params: 44,801 (175.00 KB)  
Non-trainable params: 0 (0.00 B)  
Optimizer params: 89,604 (350.02 KB)

## Reference:

[1]

“Appendicitis in children. The earlier it is caught, the easier it will be treated. | Bangkok Hospital,” *Bangkokhospital.com*, 2024.  
<https://www.bangkokhospital.com/en/content/appendicitis-in-children>