POLITECNICO
MILANO 1863

M.Sc. Computer Science and Engineering
Data Analysis for Smart Agriculture

Data Analysis On An Eggs Farm

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1 Introduction

In this study, we are going to analyze data from an eggs farm near Mantova to see if it's possible to improve both animal welfare and farmer revenue.

The farm under analysis is [//TODO INSERT NAME] and has around 40'000 chickens that produce organic eggs. We have the data starting from 2014, the production of eggs is divided into cycles lasting about 13 - 15 months each. We have 5 complete cycles and the current 2022 cycle. The first 2 cycles (called X and Y) are non-organic which means the chickens are treated differently from the last 4 cycles (Z, A, B, C) which are organic.

Upon talking with the farmer we focus our attention on 3 main topics which involve:

- Understanding the mortality between different cycles and organic with non-organic.
- Improve the welfare of the chickens.
- Quantify the monetary loss when a chicken dies at the start of the cycle.

2 Analysis of Each Cycle

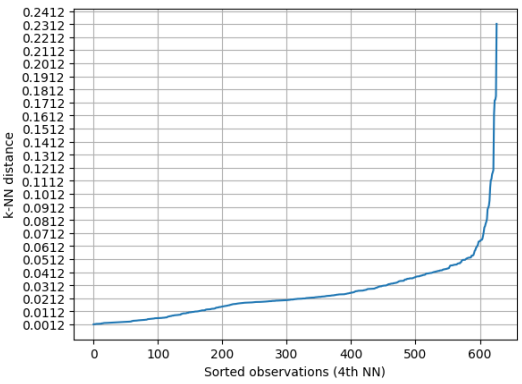
2.1 Cycle A

Arrival date	**#Chickens**	**Frist Laid**	**End of cycle**	**Organic**	**#Eggs**
19/7/2018	42.009	1/9/2018	19/5/2020	Yes	20.208.086

Significant features:

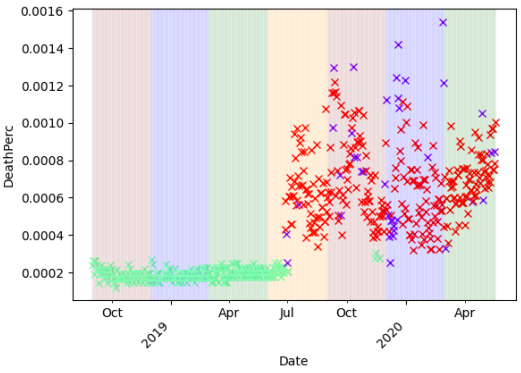
- Average Percentage of Laid Eggs each day: 83,8%
- Average Percentage of Death each day: 0,044%
- Average Temperature during the cycle: 12,99 °C
- Average Humidity during the cycle: 74,55%

Cluster:

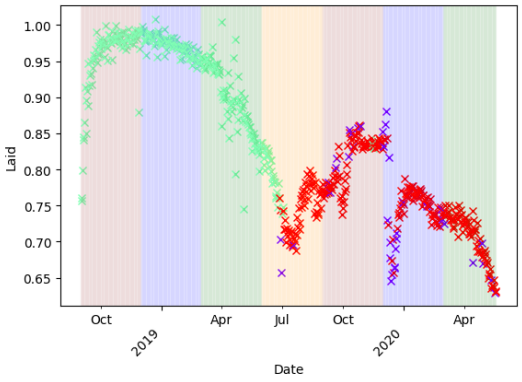


k-NN distance to find ϵ

Density scatter plot merged



Percentage of death



Percentage of laid eggs

2.2 Cycle B

Arrival date	#Chickens	Frist Laid	End of cycle	Organic	#Eggs
09/08/2020	42.098	24/09/2020	02/05/2022	Yes	18.392.640

Significant features:

- Average Percentage of Laid Eggs each day: 81,39%
- Average Percentage of Death each day: 0,0494%
- Average Temperature during the cycle: 11,81 °C
- Average Humidity during the cycle: 73,24%

2.3 Cycle C

Arrival date	#Chickens	Frist Laid	End of cycle	Organic	#Eggs
20/06/2022	42.098	08/08/2022	In progress	Yes	In progress

Significant features:

- Average Percentage of Laid Eggs each day: 55,85%
- Average Percentage of Death each day: 0,043%
- Average Temperature during the cycle: 18,61 °C

- Average Humidity during the cycle: 70,05%

2.4 Cycle X1

Arrival date	#Chickens	Frist Laid	End of cycle	Organic	#Eggs
20/01/2014	33.743	18/03/2014	08/07/2015	No	12.375.840

Significant features:

- Average Percentage of Laid Eggs each day: 80,69%
- Average Percentage of Death each day: 0,032%
- Average Temperature during the cycle: 15,34 °C
- Average Humidity during the cycle: 72,83%

2.5 Cycle X2

Arrival date	#Chickens	Frist Laid	End of cycle	Organic	#Eggs
26/05/2014	23.898	15/07/2014	21/06/2015	No	7.558.799

Significant features:

- Average Percentage of Laid Eggs each day: 95,36%
- Average Percentage of Death each day: 0,021%
- Average Temperature during the cycle: 13,76 °C
- Average Humidity during the cycle: 76,04%

2.6 Cycle Y

Arrival date	#Chickens	Frist Laid	End of cycle	Organic	#Eggs
11/08/2015	57.346	05/10/2015	27/09/2016	No	16.759.240

Significant features:

- Average Percentage of Laid Eggs each day: 83.70%
- Average Percentage of Death each day: 0,022%
- Average Temperature during the cycle: 14,20 °C
- Average Humidity during the cycle: 74,54%

2.7 Cycle Z

Arrival date	#Chickens	Frist Laid	End of cycle	Organic	#Eggs
17/11/2016	42.130	08/01/2017	27/05/2018	No	17.721.240

Significant features:

- Average Percentage of Laid Eggs each day: 87,78%

- Average Percentage of Death each day: 0,021%
- Average Temperature during the cycle: 13,07 °C
- Average Humidity during the cycle: 74,27%

3 Common features

4 Organic vs non-organic cycles

5 Death-season correlation

6 Economic results