

**Ain Shams University**

**Faculty of Computer and Information Science**

**Scientific Computing department**

**Ain shams university**

**Faculty of computer and information science**

**Bioinformatics department**

**Assignment 1 – Deep Learning & Neural Networks Course**

**Single Layer Perceptron**

**By**

|  |  |  |
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## Features Linearity Visualization

1. Between the 3 classes

Chart, scatter chart

Description automatically generatedChart, scatter chart

Description automatically generated

A picture containing chart

Description automatically generatedChart, scatter chart

Description automatically generated

Chart, scatter chart

Description automatically generatedChart

Description automatically generated

Chart, scatter chart

Description automatically generatedText

Description automatically generated

Chart

Description automatically generatedChart, scatter chart

Description automatically generated

1. Between class Adelie (red) and Chinstrap (black)

Chart, scatter chart

Description automatically generatedChart, scatter chart

Description automatically generated

Chart

Description automatically generated with medium confidenceChart, scatter chart

Description automatically generated

Chart, scatter chart

Description automatically generatedChart

Description automatically generated

Chart, scatter chart

Description automatically generatedChart, text

Description automatically generated

Chart, scatter chart

Description automatically generatedChart

Description automatically generated

The following combinations can discriminate between the 2 classes:

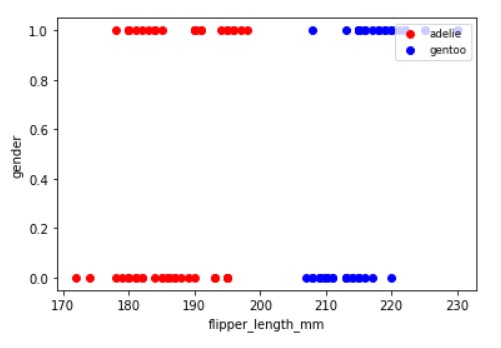
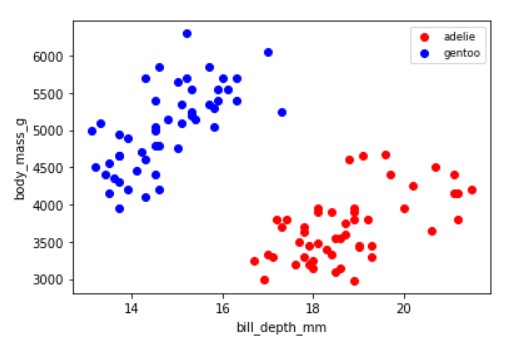
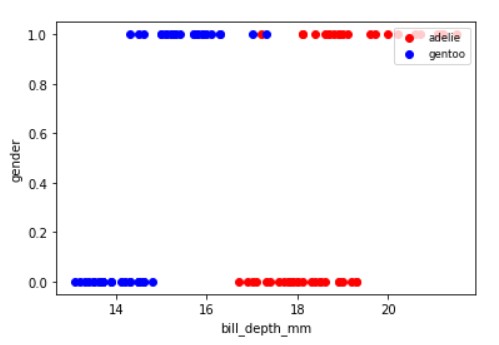
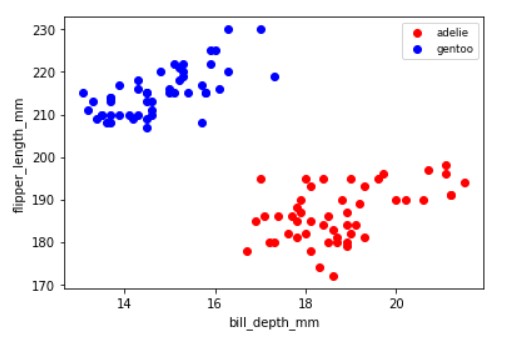
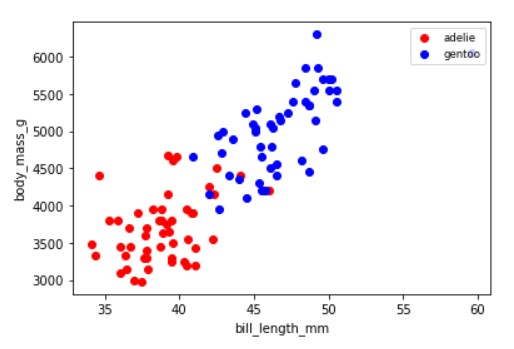
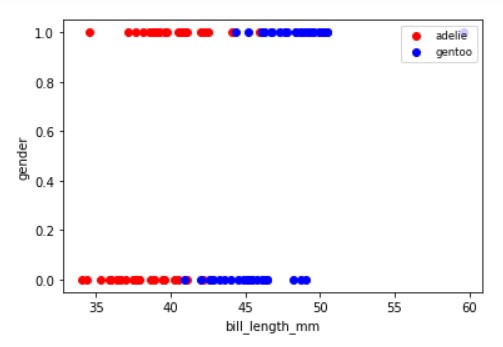
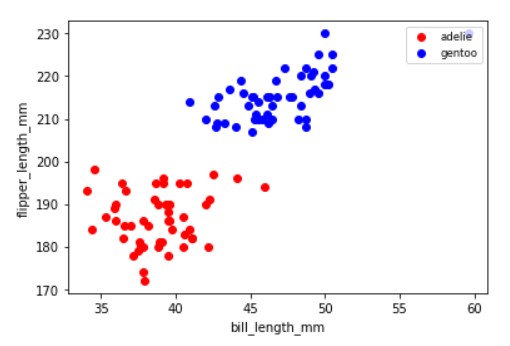
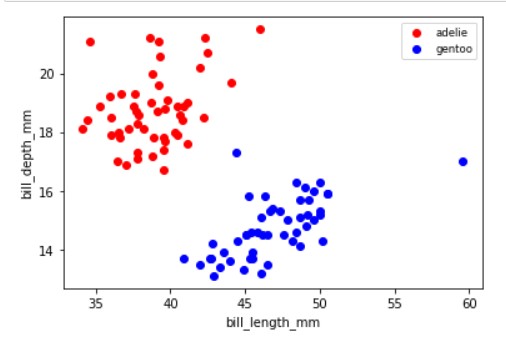
* Bill length & bill depth
* Bill length & gender

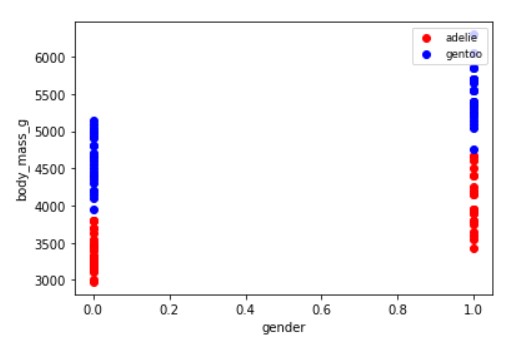
The following combinations can discriminate between the 2 classes but with some error as they are not linearly separable:

* Bill length & flipper length
* Bill length & body mass

The rest of the features cannot be separated linearly at all

1. Between class Adelie (red) and Gentoo (blue)

Chart, scatter chart

Description automatically generated

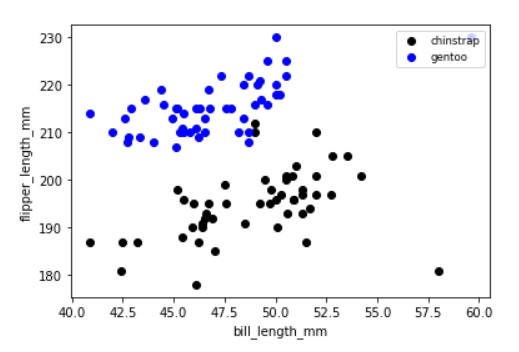
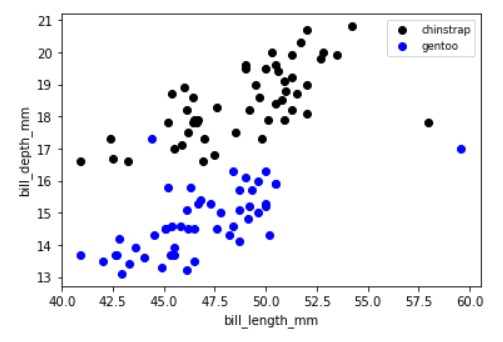
The following combinations can discriminate between the 2 classes as they are linearly separable:

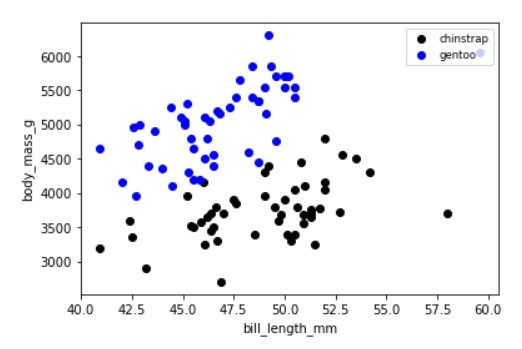
* Bill length & bill depth
* Bill length & flipper length
* Bill depth & flipper length
* Bill depth & body mass
* Flipper length & gender
* Flipper length & body mass
* Gender & body mass

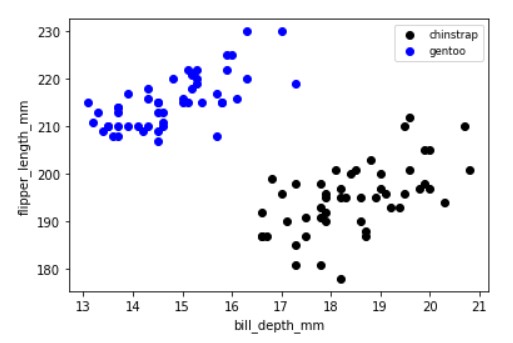
The following combinations can discriminate between the 2 classes but with some error as they are not linearly separable:

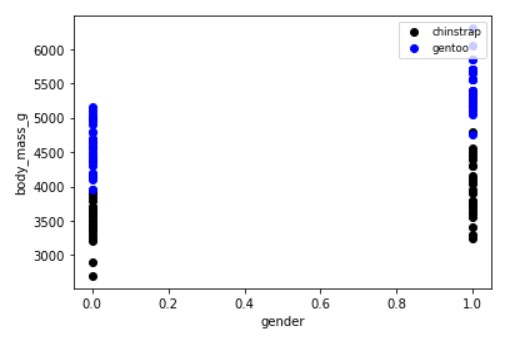
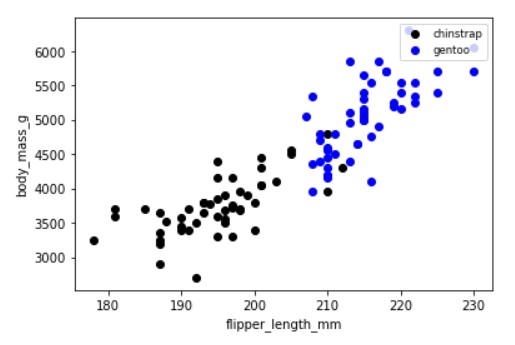
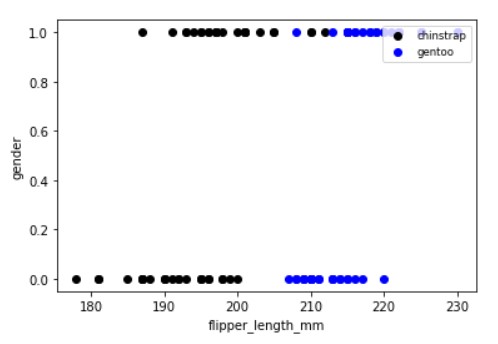
* Bill length & gender
* Bill depth & gender (error in 1 point)

1. Between class Chinstrap (blue) and Gentoo (black)

A picture containing text

Description automatically generatedChart, scatter chart

Description automatically generatedA picture containing chart

Description automatically generated

The following combinations can discriminate between the 2 classes:

* Bill depth & body mass
* Bill depth & flipper length
* Bill depth & gender

The following combinations can discriminate between the 2 classes but with some error as they are not linearly separable:

* Bill length & bill depth
* Bill length & flipper length
* Bill length & body mass
* Flipper length & body mass
* Flipper length & gender

Preprocessing

Training