# **Motivations**

## **Non Linear Hypothesis**

* This is a super-vised Learning classification problem.
* Applying Logistic Regression to this problem.  
  By applying we got a hypothesis that separates positive and negative examples.
* This idea works well only for two features x1 and x2.

But in building a ML model, we require still more features to get better and accurate results.

There are 100 different features to predict the house price.  
So for this what will happen we include all the quadratic terms.

Quadratic features

Including all the quadratic features over-fits the data and computationally expensive.  
So we can include only a subset of features.

Chart, scatter chart

Description automatically generatedIncluding only the above features doesn’t capture very complex hypothesis.  
It will result in a circle which is totally in-evident.

Cubic features

Consider this problem of Computer VisionA picture containing graphical user interface

Description automatically generatedGraphical user interface, website

Description automatically generated

Need for a Non-Linear Hypothesis

Diagram

Description automatically generatedGraphical user interface

Description automatically generatedChart, scatter chart

Description automatically generated

Lets put all the pixel values and their corresponding type (i.e cars/non cars)

Diagram

Description automatically generated

## **Quiz**

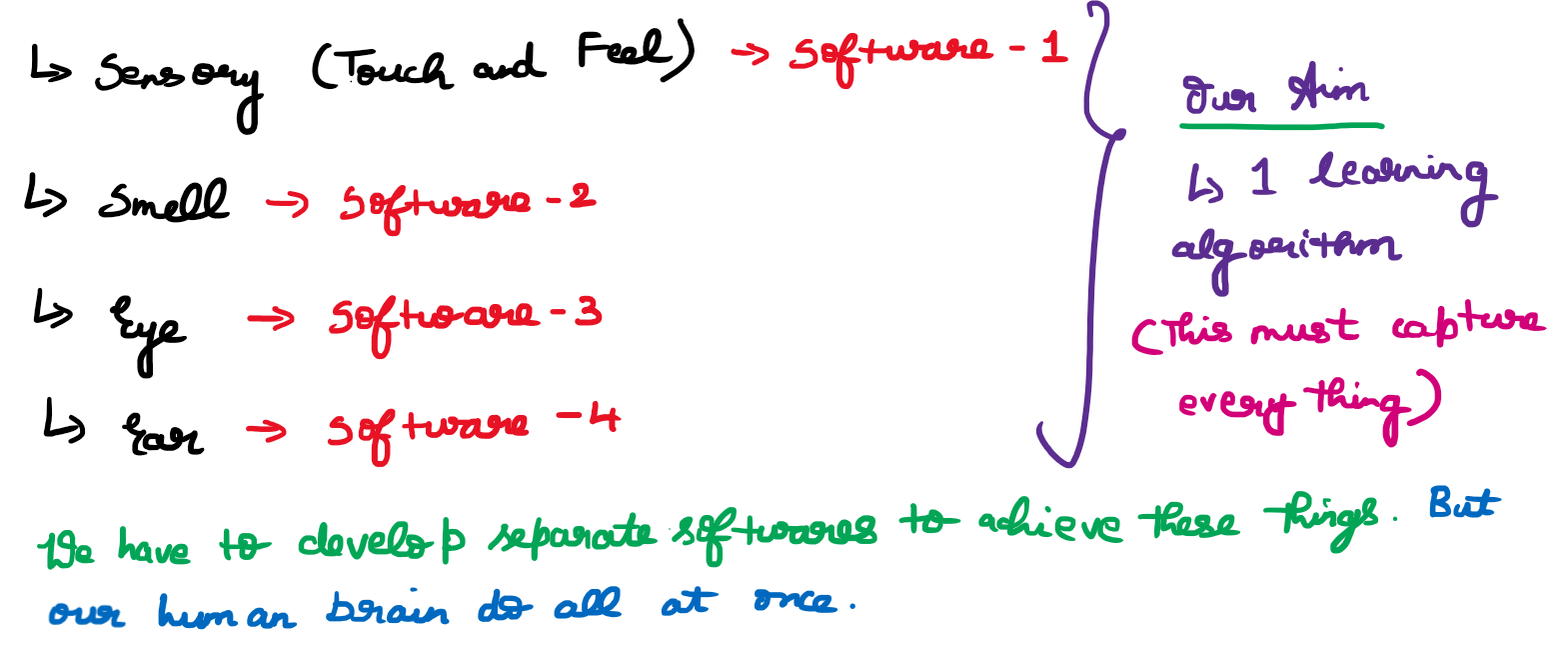
Graphical user interface, text, application

Description automatically generated  


So, simple logistic regression together with adding in maybe the quadratic or the cubic features - that's just not a good way to learn complex nonlinear hypotheses when n is large because you just end up with too many features.

## **Neurons and the Brain**

### **Neuro Re-wiring Experiments**



Diagram

Description automatically generatedText

Description automatically generated with medium confidenceA picture containing text

Description automatically generated

Diagram

Description automatically generated

And instead of needing to implement a thousand different programs or a thousand different algorithms to do, you know, the thousand wonderful things that the brain does, maybe what we need to do is figure out some approximation or to whatever the brain's learning algorithm is and implement that and that the brain learned by itself how to process these different types of data.

Text, letter

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A picture containing website

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Text

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So that each pixel gets mapped to a location on your tongue where maybe a high voltage corresponds to a dark pixel and a low voltage corresponds to a bright pixel and, even as it does today, with this sort of system you and I will be able to learn to see, you know, in tens of minutes with our tongues.

A picture containing logo

Description automatically generated  
The blind people can clap their hands, so that the sound reaches and bounce back from the objects that is in front of them. In this way they will able to identify which is object is in front of them.

Text

Description automatically generated

Third example is the Haptic Belt where if you have a strap around your waist, ring up buzzers and always have the northmost one buzzing. You can give a human a direction sense similar to maybe how birds can, you know, sense where north is. it's pretty amazing to what extent is as if you can plug in almost any sensor to the brain and the brain's learning algorithm will just figure out how to learn from that data and deal with that data.

***it's pretty amazing to what extent is as if you can plug in almost any sensor to the brain and the brain's learning algorithm will just figure out how to learn from that data and deal with that data.***

And there's a sense that if we can figure out what the brain's learning algorithm is, and, you know, implement it or implement some approximation to that algorithm on a computer, maybe that would be our best shot.

Diagram

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Text

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Diagram

Description automatically generated

The above diagram represents a single neuron.  
Diagram, schematic

Description automatically generated

Text, whiteboard

Description automatically generatedAnother example

Diagram, schematic

Description automatically generated

A picture containing light, blur

Description automatically generatedText

Description automatically generatedBackground pattern

Description automatically generated

# **Neural Networks**

## **Model Representation-1**

## **Model Representation-2**

# **Applications**

# **Review**