```
Cecture 15 Classification Code Prep
 Machine Germiny is Nothing but
  a geo-etry probbles
                                                                                        1. Coace the duta
  1-1> Fit line or curve
   Regression
                                                                                       2. Process duter
-17 x Dinension date so no
                                                                                       3. Create Model -1> sa-e + the signoise
     or fit a curve -1> De-inishing Return
                                                                                       4. cour verte Model
-1> Classification
    Li> Preciet a label
   Plot a grier then drew
                                                                                           60 Grain disserent
      borner -1> line of best seperation
                                                                                              Loss Function
 All date is the Some o
                                                                                              optimizer -17 ada- is Industry standard
    4> Models don't know the
      context and don't core
                                                                                      Cecture 18 Neuverl primer
      about it.
                                                                                         -> activation functions/
  Regression Basics
                                                                                             action potenbior
     Finer Line OF best Pit
     Scilcit Leurn
    x + y -1> Lineerregression ()
                                                                                             N= NOt activated
    Model.fit (x,y)
                                                                                             Y= activated
     Pyborch No precience Movels
                                                                                          All or nothing principle.
      No Fit Function
                                                                                      lecture 19: How cross a Mourel Ceern?
     Mair Concepts
     1. How cross linear regression work
                                                                                      -Myininizing Cost.
                                                                                              LID Gradient is when there is
     2. How do we value predictions
                                                                                                  More then 1 verienble
     3 How do we fit the Model
                                                                                               In Gradient descent is comering
                                                                                                    the cost as Much as
    J. y = Mx + 6
                                                                                                      possible.
                                                                                                Von reed gradien descent because
         1-1> Coss Function (punishes)
                                                                                               apart from linear regression
             1-1> Quentifies fit
                                                                                                    AT=0 doesn't work so we need
            1-17 Finals the best line
                bhat has lo-est Meum
                                                                                                       convergence and gradient
                Squeren error.
                                                                                                       cles cent to & Ministère cost
             In best values
        Grewient descent
          1-1> Final optimal veriables
      Leuture 10. Regression Coure Prep
         Concepts to Syntax.
        I-postent Script Y
                                                                          aradient
                                                                                                                 Fiverie
     1 Building the Model
                                                                              descent
         # Crewle Lin Regression Mourel
          nn. Linear (1,1)-12 output Size
                                                                                                              co-vergence
                     J-17 inp Size
         Trein the Model
                                                                                                          to choose L
         # Loss and opti-izer
                                                      Lecrong reute
                                                                                                                           1-12 Cearning Rate
           criterion = nn.175Eloss C)
           optimizer = torch. optim. SGD (Model. pura-eters (), Lr = 0.1)
                                                                                                   J. Hyper para-eter
             1-1> Gradient descent 600P.
                                                                                                             Lis No good wary to calculate
just use grid searching.
               # Trein the Mocret
                   n-cpochs = 30 (600,25)
                   for it in range (n-epochs):
                     # Zero the peren- granients
                                                                                                      One very to do it
                                                                                                      1-1> Check Loss

1-1> Check Loss
                       optimizer, zero-grenc ()
                     # forward pass
                       outputs = 14 ociel (inputs)
                       Loss = criterion (out puts, targets)
                     # Backwerus and optinize
                                                                                                                          of is too high
                       LOSS. Backwards ()
                       opti-izer. Step ()
                                                                                                                              4> 6 15 600 60m
        Y, X -12 10- py array
       Inputs, turget = Tensor
       Arreey to tenson
                                                                                                 problem is you need to run the
        (Nu--Sa-ples x Nu - di-c-Sions)
                                                                                                     whore Moriel for bhis
        X = X. reshape (10,1)
                                                                                                                  Eulces
        y= y. reshape (N,1)
                                                                                                     too High Not accurate
      # Pytorch uses Ploont 32
       Nurpy creutes floort 64 prekum torch tensors
                                                                                                     Cearning Rate (2) = Step size)
       Inputs = torch. fro--n-py64 (x. astype(NP. Flowt32)
       Euryes - torch. From - nupy64 (y. astype (np. flout32)
                                                                                                  Cecture 20: Model with Logit
                                                                                                     Logit = i-put ibto stertistic fu-ction
       Making Predictions
       # Forward pass
                                                                                                               Lis (sig-vice fu-ction)
         outputs = Moder (Inputs)
              Lis Just gives tensor
        predictions = model (imputs)
                                                                                                  Lecture 21 Treni-Sets Voulidation and test Sets.
         · detatch().nu-py()
                                                                                                     Over fitbing et co-best.
            1-1> detatches grouph + converts to
                                                                                                      700 co-plex -12 overfit
                                                                                                      Not co-plex enong 1> Poot fit overall
        n-epochs is the Hyperporen-eter
                                                                                                       Bius verience truce off,
           you Ichon the answer
              Hollsased on Eransistors.
      Moores Law Cecture 12
                                                                                                               Variance
                                                                                                                         Variance
         co-putine power increuses exponentially
                                                                                                        Underfitting
         Not linear??
           Hoy Cog C = logr x t + cog Co
         To use Models they Should
                Lis or centered around 0
                                                                                                        arc: domingo 2012
               anderecization
                                                                                                                          Overfitting
                 Lis Mean O, variance 1
         Becaus of two transfor-actions
           Interpretation isn't straight forward.
                                                                                                      Cross vulielation is hardly used
                                                                                                        in eleep learning
            t' 4> teprime since me don't know
             wheat it is yet.
                                                                                                      1 Training talces Long
2. Douter sets are large (small verience)
      Cecture 17 Classification Basics.
          Nothing how changed code vise.
          only changes are within the functions.
                                                                                                        So the use Hold out ever.
           Cinear Classification -1> Cine seperates groups
            1-05mula w, x, + 42 x2 + 6 = 0
          Decision Ruce
                                                                                                         Voilielatier Sets
                                                                                                         Choices -17 Hyper poranters
                                                                                                             pick I-portures
                                                                                                                 to weed out the 100ise
                          1-1> signoid function
1-1> easy s-ooth.
           1-1-20-plex function
          the weight is I-portemt for howing unitiple verienbles.
```

Scation 4: What is 1916

1> Spacial Reasoning

Main Difference is Coss Function

Coss -1> Binary cross entropy loss