Learning on Semi-Rings

# Abstract

Consider multi-linear regression:

The matrix vector product is on the (+,x) ring. We can change to the tropical (min,+) ring for example and get

if M has vectors of constants, and the x are dawn from random distributions, then we can consider the derivative. If the loss on targets is

With as the prediction and y as the labels. Then

Consider

where

We can ask what is the probability that a given element of the min(.,.,.,.,.) is the minimum. We can backpropagate proportionally to this? For the two variable case above we have