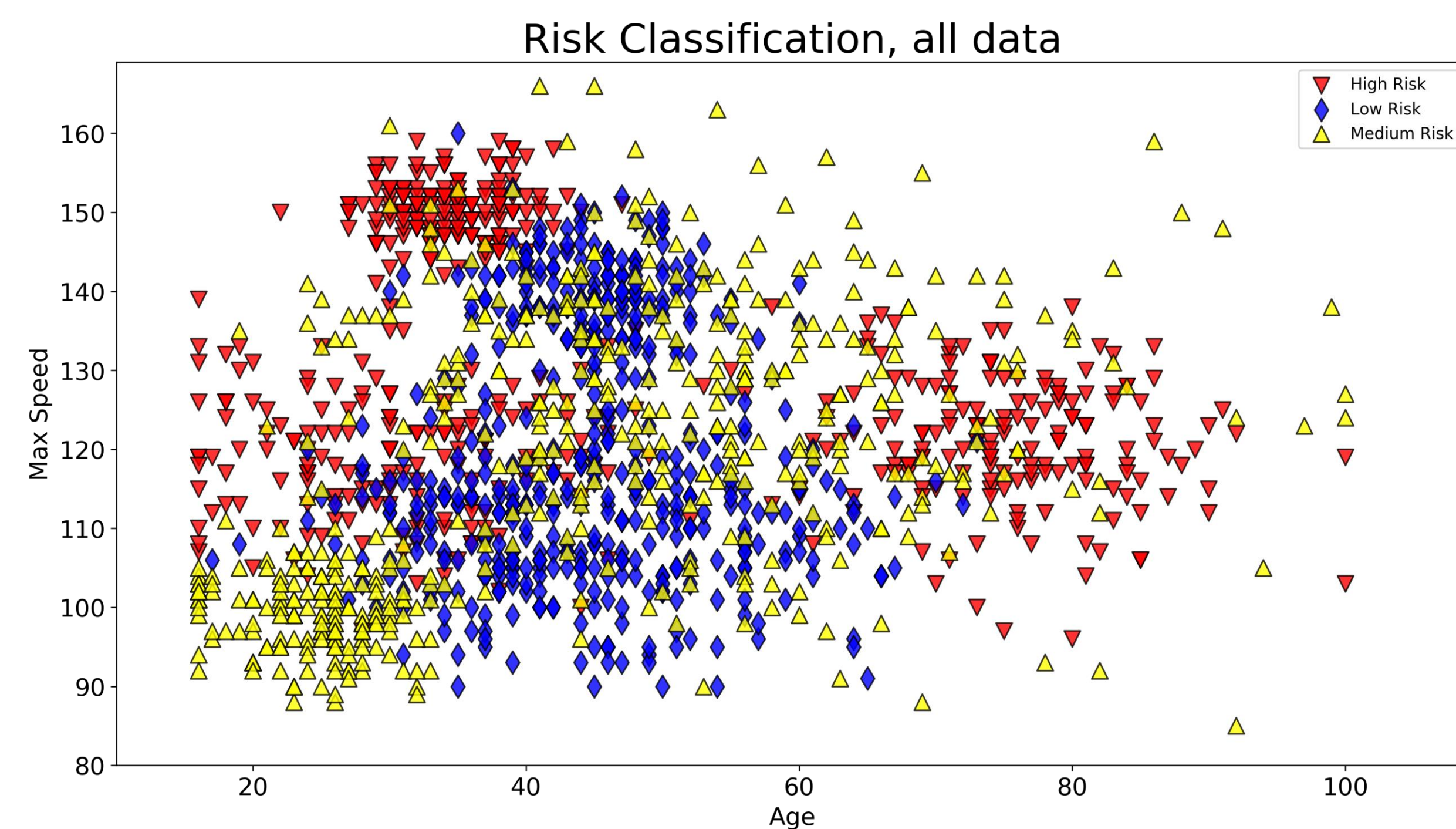


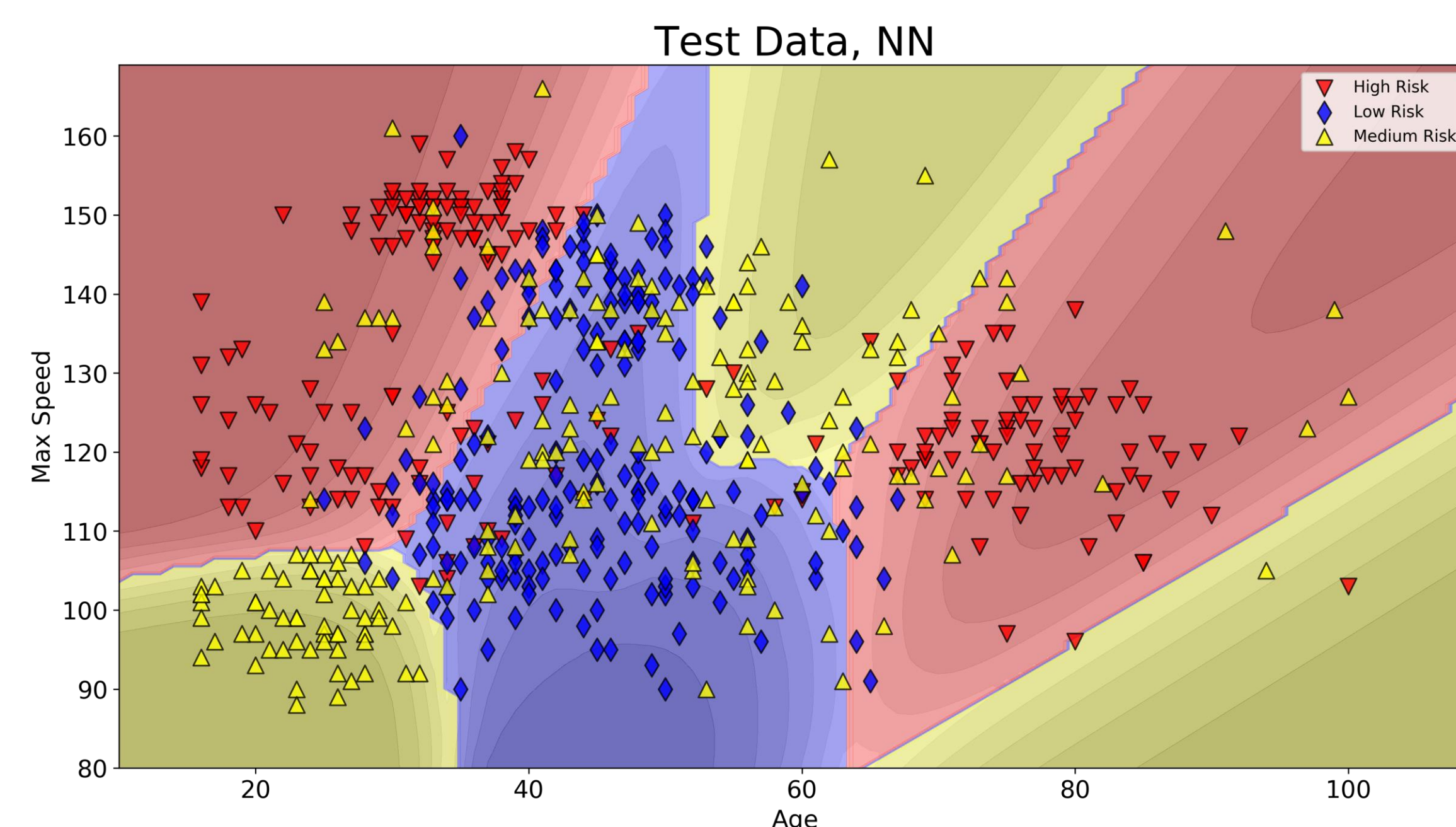
Scaling Down – Squaring Deep Neural Networks for interpretability and lightweight deployment

Use Case - Risk Prediction

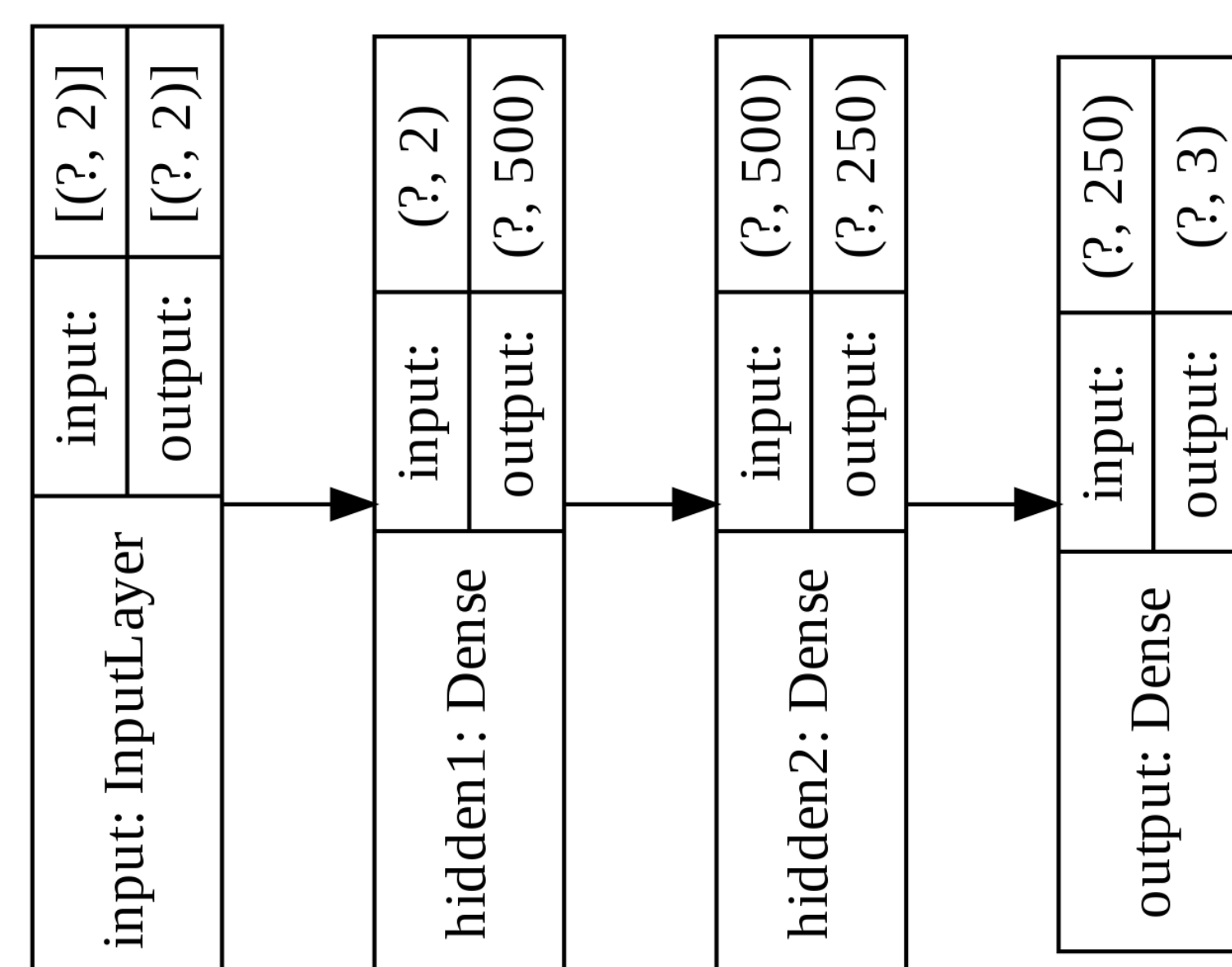
We want to score the risk of drivers based on their age and max speed of their cars



Deep Neural Networks perform well



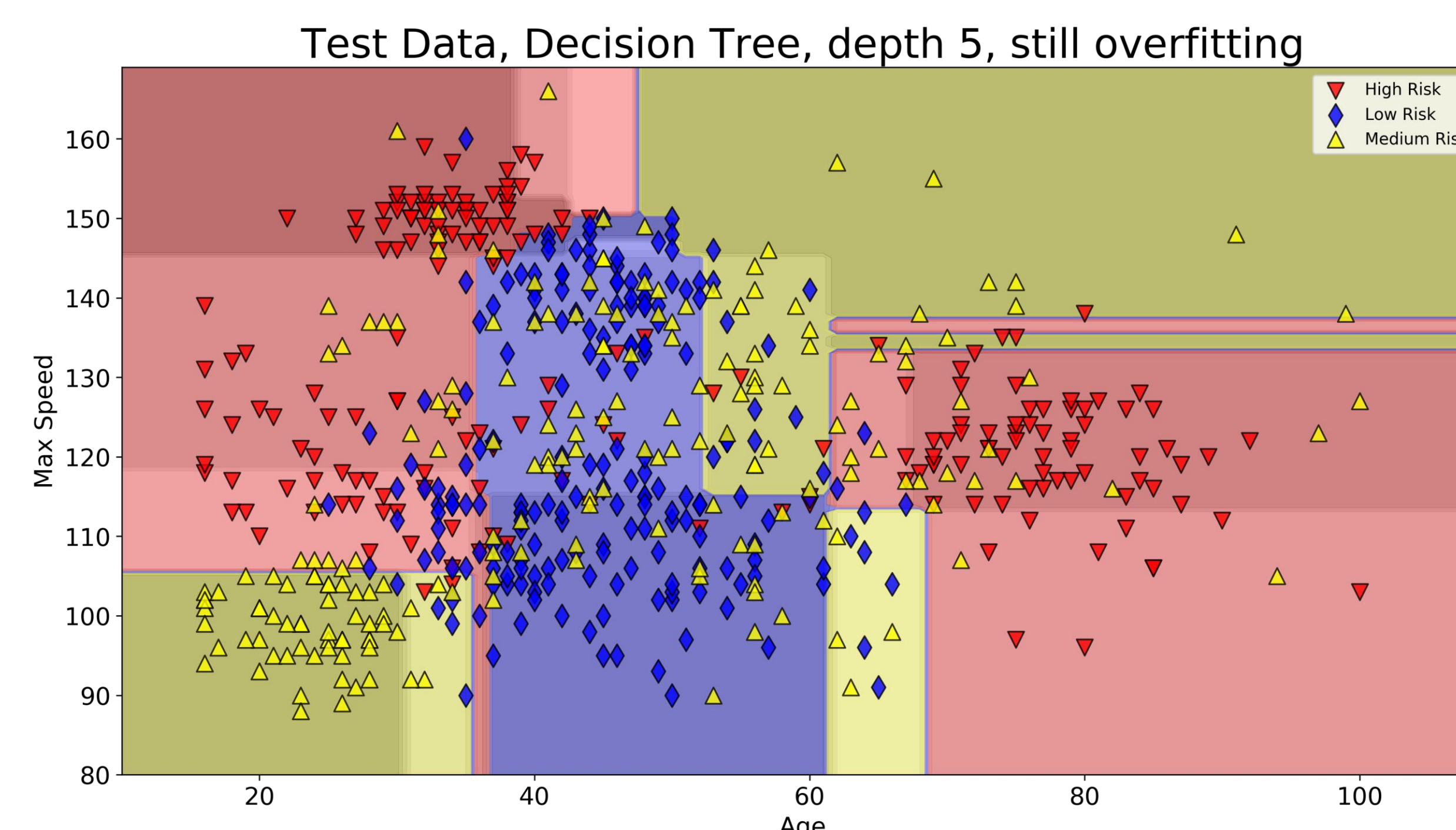
l1 regularization gives good accuracy (70%) without any overfitting, but also 130k parameters make this a block box



Oliver Zeigermann,
<http://scaledml.org/2020/>

Decision Trees offer explainability

- *the right to explanation is well established by the GDPR and United States' Credit score*
- *shallow decision trees allow for at least a basic level understanding,*
- *but tend to overfit even when regularized*
- *can be used to generate readable code*



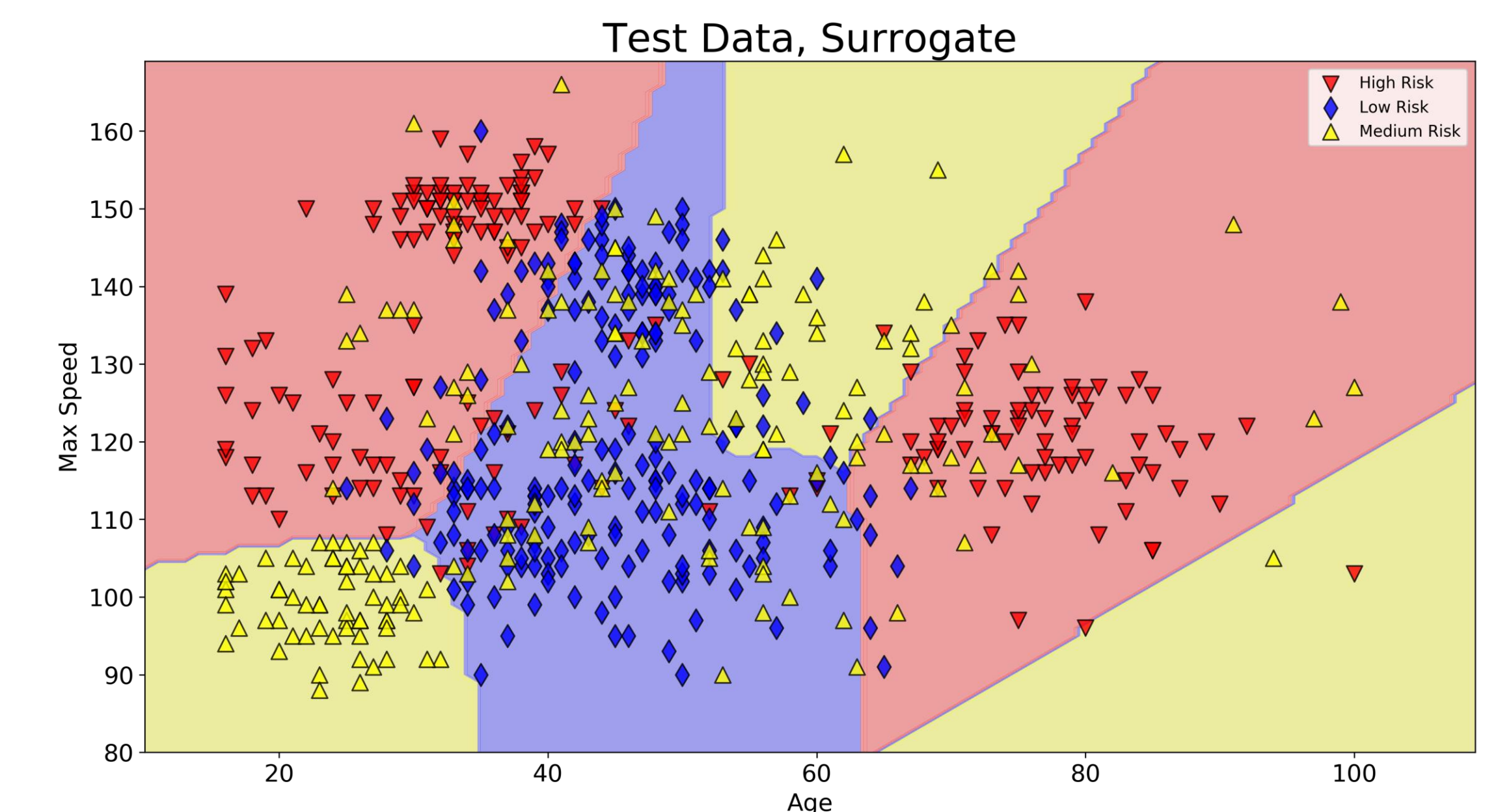
Best of both worlds – use DNN as a teacher for Student Decision Trees

1. *high capacity deep neural network is trained and regularized like shown in left column*
2. *used to predict a dense set of data over complete range of domain*
3. *this data, not original data, is used to train decision tree*
4. *by restricting depth of student decision tree you can balance between accuracy and interpretability*
5. *In both cases no overfitting is expected*

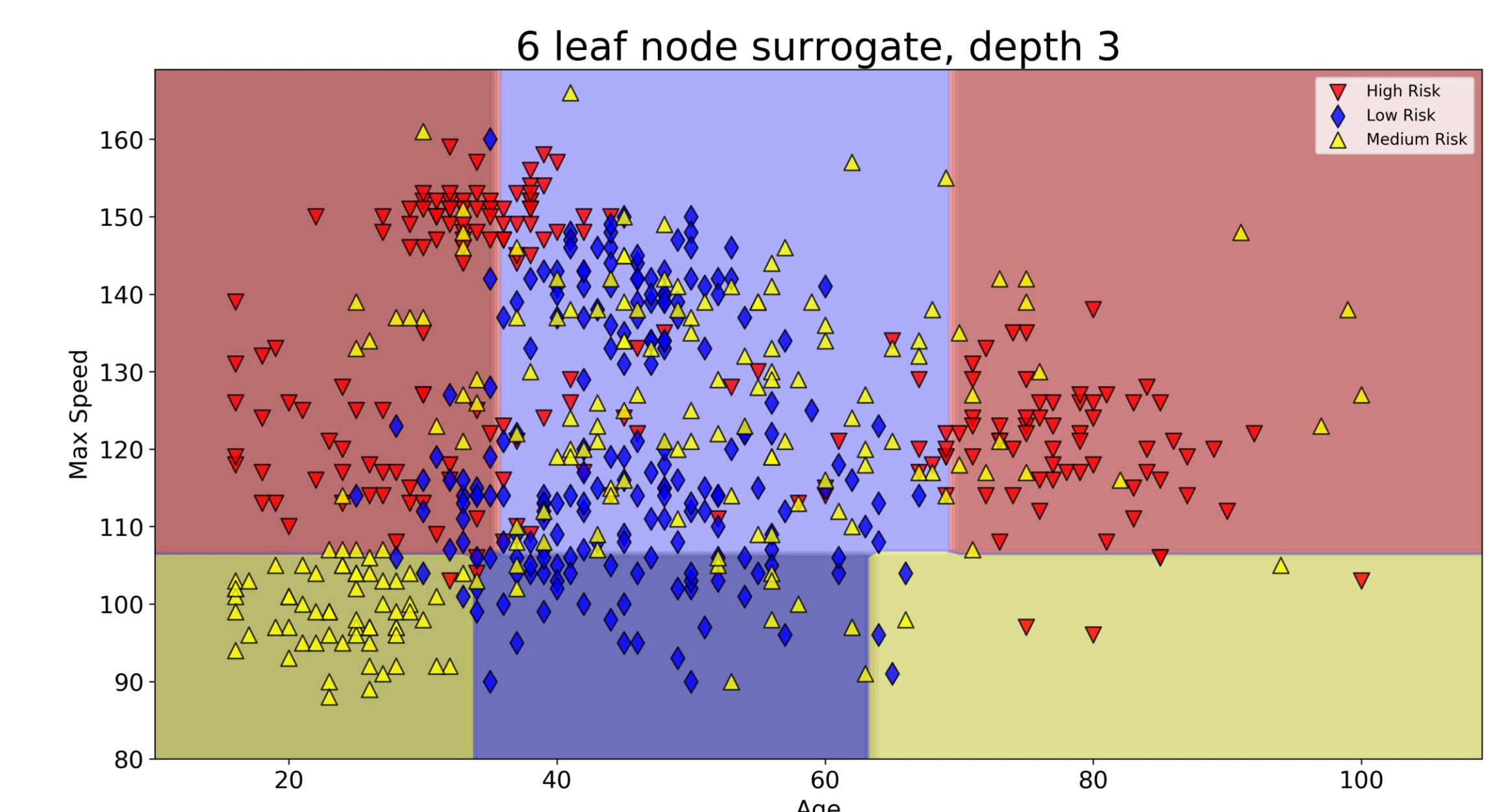
Notebook: <http://bit.ly/scaling-down-2020>

Decision Trees can be tuned for

accuracy: same score as teacher, but depth of 12



interpretability: 62%, 6 leaf nodes, depth of 3



Sample prediction path (kudos to dtreeviz)

