**2 – Mountain Car Problem**

1. The state space consists all pairs of car position and car speed -

Where-

The action space consists of three actions where defines in which direction the car creates force (which effects the velocity of the car)-

The state-action reward is –  
Plot of 2 first features:  
A close up of text on a white background

Description automatically generated  
A close up of a logo

Description automatically generated  
We can see that the 2 first features are actually being activated the most when the position is at the most left and velocity is the maximum to the left. This probably won’t be activated on real experiments as we probably have almost 0 velocity on the left most position when we change the direction back to the target state (the flag).  
Probably, the most activated RBF would be when we at the bottom of the hill with the maximum speed achieved (on both directions).

1. Encoding using RBF can give the following advantages:
   1. The RBFs can describe any none linear function as a superposition of its components. The as a vector is then used as linear combination of these RBFs to approximate any none linear function we wish. And we only need to solve a linear regression problem (instead of a none linear).
   2. We can reduce the states space to a different dimension, thus we can avoid the curse of dimensionality of states space (too big states’ space).
   3. We may use the “kernel trick” on these RBF kernel functions in order to avoid complex or big calculations in the states space.