

1 Calculate the Recommended Speed

We use the standard formula of velocity to calculate the recommended speed, h for arriving at the next traffic light while it is green. We calculate two velocities: one for arriving at the traffic light just as it changes to green and one as it changes to red, and the recommended velocity is therefore somewhere in between.

$$h_g = \frac{s}{t_g}$$

$$h_r = \frac{s}{t_r}$$

$$h_r \leq h \leq h_g$$

where

- s is the distanced between the vehicle and the traffic light
- t_g is the number of seconds before the traffic light changes to green
- t_r is the number of seconds before the traffic light changes to red
- h_g is the speed one needs to drive in order to arrive at the traffic light when it changes to green
- h_r is the speed one need to drive in order to arrive at the traffic light when it changes to red
- h is the recommened speed

In practice we use Algorithm 1 to get the recommended speed.

Algorithm 1 GetRecommendedSpeed()

$nextTL$ = next traffic light on route
 d = distance to $nextTL$. ∞ if no traffic light ahead
 $spans$ = list of start and end time points in which $nextTL$ is green
 t = current time
 h_{max} = speed limit
 $h_g = 0$
 $h_r = 0$
if vehicle in junction or $d = \infty$ or $nextTL$ too far ahead **then return** h_{max}
end if
for all (s_1, s_2) in $spans$ **do**
 $t_s = s_1 - t$ ▷ Seconds until $nextTL$ is green
 $t_e = s_2 - t$ ▷ Seconds until $nextTL$ is red
 $h_r = \frac{d}{t_e}$
 if $t > s_2$ or $s_2 \leq 0$ or $h_r > h_{max}$ **then**
 continue
 end if
 if $t_s \leq 0$ **then**
 $h_g = h_{max}$
 else
 $h_g = \frac{d}{t_s}$
 end if
 if $h_g < 0$ **then**
 $h_g = 0$
 else if $h_g > h_{max}$ **then**
 $h_g = h_{max}$
 end if
 return h_g
end for
return h_{max}
