

Contemporary Data Processing Technology (CCOD)
Lab 2 (September 15, 2016)
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Controll two metro cars using Speed, Distance, and Brake

In this work, it was necessary to modify the previous system of the virtual subway. Every step, Speed x is added + 2, 0, -2 at random, not + 1, 0, -1 like last subject. Also, the brake is now takes on values depending on the situation: if the distance is less than or equal to 50, the brake is 9, and if more than or equal to 14 speed, the brake is equal to 1. Also show the membership value of 3 rules {IF x =medium AND y =small THEN z =strong} OR {IF x =medium AND y =medium THEN z =medium} OR {IF x =medium AND y =large THEN z =weak}

The source code:

mc.html

```
<!DOCTYPE html>
<html>
<head>
<meta charset="UTF-8">
<title>Lab1MetroCar</title>
</head>
<body>
<div style="width:500px; margin:2px;">
<div id="MetroCar1" style="display:inline-block"></div>
<div id="MetroCar2" style="float:right"></div>
</div>
<canvas id="myExersize" width="500" height="500" style="border:3px solid #2ecc71;
background:#34495e">
</canvas>
<script src="./.js"></script>
</body>
</html>
```

source.js

```
var sdvig1 = Math.PI/2;
var sdvig2 = Math.PI * (1.5);
function ChngCoord(x, y, r, sdvig) {
return {
x: Math.round(Math.cos(sdvig)*r+x),
y: Math.round(Math.sin(sdvig)*r+y)
}
}
var MetroCar1 = {
speed: 10,
brake: 0,
dist: 500
};
var MetroCar2 = {
```

```

speed: 10,
brake: 0,
dist: 500
};
var brake = false;
setInterval(() => {
  if (brake) {
    return;
  }
  transform_pos();
},
150);
function paint(sdvig1, sdvig2) {
  var poztion_1 = ChngCoord(250, 250, 200, sdvig1);
  var poztion_2 = ChngCoord(250, 250, 200, sdvig2);
  var canvas = document.getElementById("myExersize");
  var izo = canvas.getContext("2d");
  izo.clearRect(0, 0, 500, 500);
  izo.beginPath();
  izo.arc(250, 250, 200, 0, 2 * Math.PI);
  izo.stroke();
  izo.beginPath();
  izo.fillStyle = "#7f8c8d";
  izo.fillRect(poztion_1.x - 20, poztion_1.y - 20, 40, 40);
  izo.beginPath();
  izo.fillStyle = "#1abc9c";
  izo.fillRect(poztion_2.x - 20, poztion_2.y - 20, 40, 40);
}
function transform_pos()
{
  paint(sdvig1, sdvig2);
  if (MetroCar1.dist <= 0 || MetroCar2.dist <= 0)
  {
    paint(sdvig1, sdvig1);

```

```

MetroCar1.dist = MetroCar1.dist <= 0 ? 0 : 1000;
MetroCar2.dist = MetroCar2.dist <= 0 ? 0 : 1000;
brake = true;
}
var MC1 = document.getElementById("MetroCar1");
var MC2 = document.getElementById("MetroCar2");
MC1.innerHTML = 'MetroCar1 \nx: ' + MetroCar1.speed + '\ny: ' + MetroCar1.dist + '\nz: '+
MetroCar1.brake+'\n\u00B5: ';
MC2.innerHTML = 'MetroCar2 \nx: ' + MetroCar2.speed + '\ny: ' + MetroCar2.dist + '\nz: '+
MetroCar2.brake+'\n\u00B5: ';
MetroCar1.brake=0;
MetroCar2.brake=0;
MetroCar1.speed += (1 - Math.floor( Math.random() * 3 ))*2;
if (MetroCar1.speed>=14)
{
MetroCar1.brake=1;
MetroCar1.speed-=MetroCar1.brake;
}
if (MetroCar1.speed > 20)
{
MetroCar1.speed = 20;
}
if(MetroCar1.dist <= 50 )
{
MetroCar1.brake=9;
MetroCar1.speed-=MetroCar1.brake;
}
if (MetroCar1.speed < 0)
{
MetroCar1.speed = 0;
}
MetroCar1.dist -= MetroCar1.speed;
MetroCar2.dist += MetroCar1.speed;
MetroCar2.speed += (1 - Math.floor( Math.random() * 3 ))*2;

```

```

if(MetroCar2.speed >=14)
{
MetroCar2.brake=1;
MetroCar2.speed-=MetroCar2.brake;
}
if (MetroCar2.speed > 20)
{
MetroCar2.speed = 20;
}
if(MetroCar2.dist <= 50 )
{
MetroCar2.brake=9;
MetroCar2.speed-=MetroCar2.brake;
}
if (MetroCar2.speed < 0)
{
MetroCar2.speed = 0;
}
MetroCar1.dist += MetroCar2.speed;
MetroCar2.dist -= MetroCar2.speed;
sdvig1 += MetroCar1.speed * Math.PI / 500;
sdvig2 += MetroCar2.speed * Math.PI / 500;
}

```

Membership function

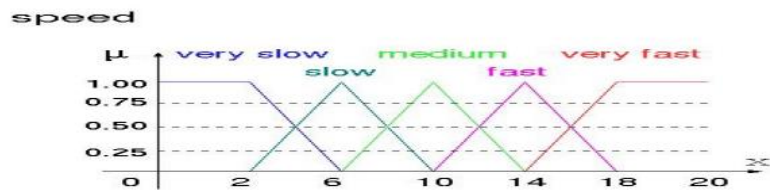


Figure 7: An example of 5 membership function for speed.

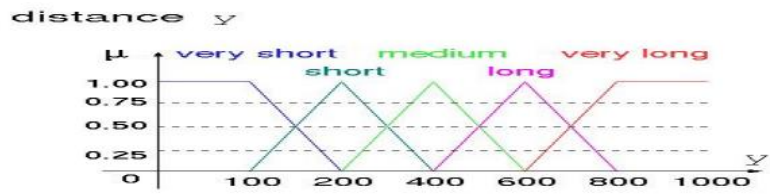


Figure 8: An example of 5 membership function for speed.

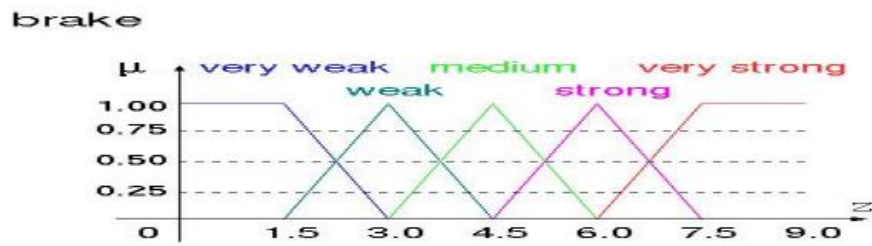
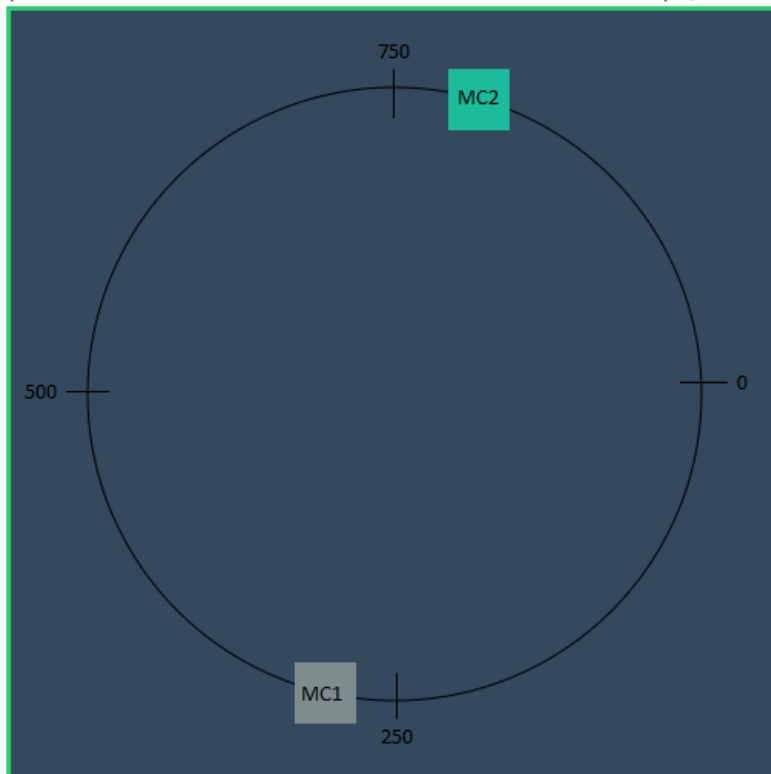


Figure 9: An example of 5 membership function for speed.

MetroCar1
x: 10
y: 508
z: 0
μ: 0

MetroCar2
x: 10
y: 492
z: 0
μ: 0



IF x=medium AND y=small THEN z=strong

MC1	speed	μ	Distance	μ	break	μ	total μ
	10	1	508	0	0	0	0

MC2	speed	μ	Distance	μ	break	μ	total μ
	10	1	492	0	0	0	0

IF x=medium AND y=medium THEN z=medium

MC1	speed	μ	Distance	μ	break	μ	total μ
	10	1	508	0,45	0	0	0

MC2	speed	μ	Distance	μ	break	μ	total μ
	10	1	492	0,54	0	0	0

IF x=medium AND y=large THEN z=week

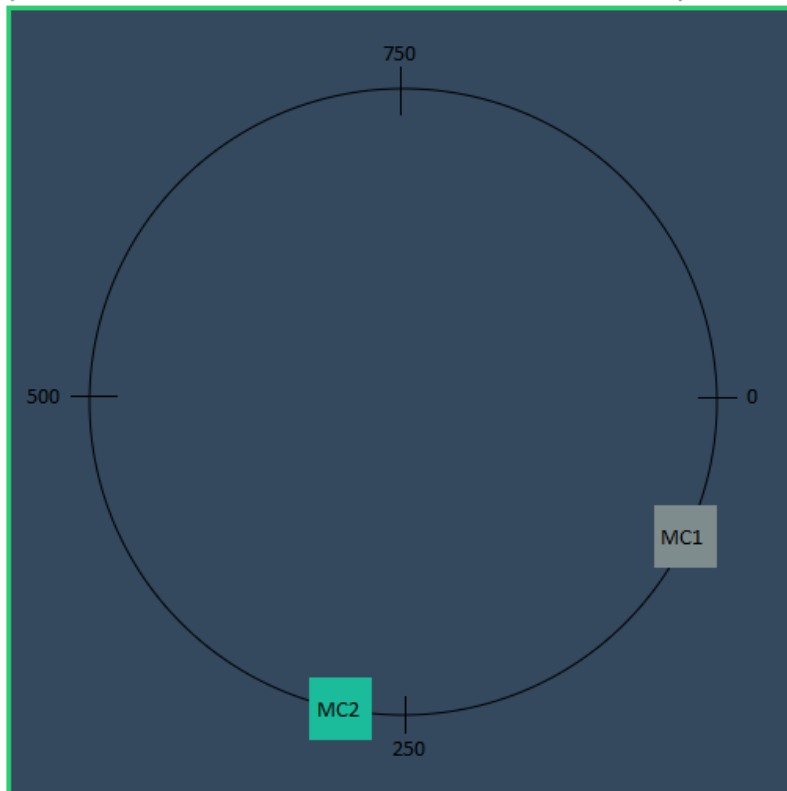
MC1	speed	μ	Distance	μ	break	μ	total μ
	10	1	508	0,54	0	0	0

MC2	speed	μ	Distance	μ	break	μ	total μ
	10	1	492	0,45	0	0	0

By analogy, we obtain the other values

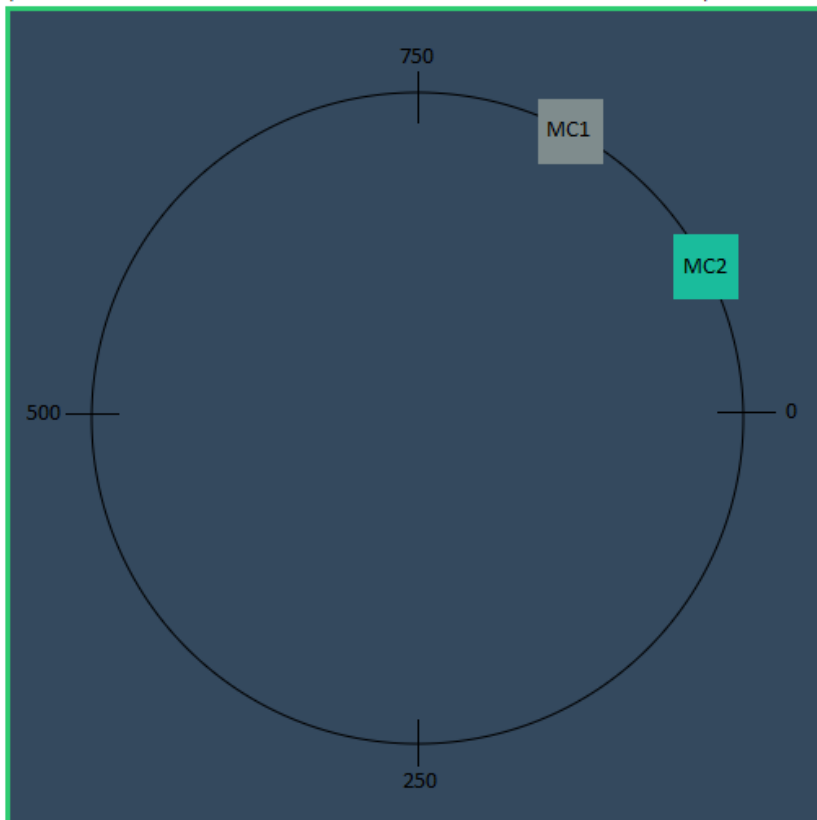
MetroCar1
x: 11
y: 211
z:0
 μ :0

MetroCar2
x: 14
y: 789
z:1
 μ :0



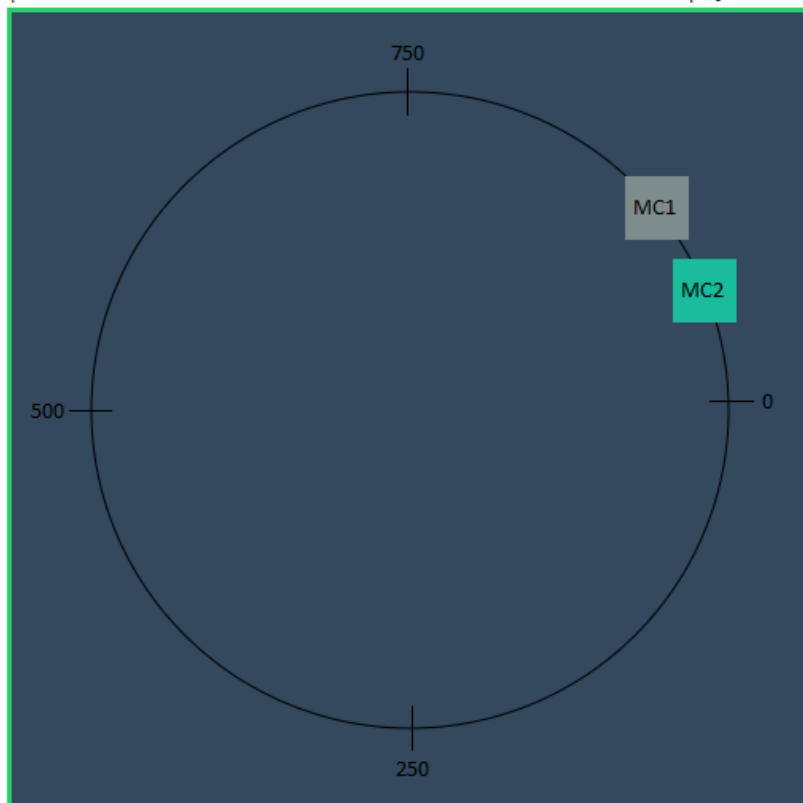
MetroCar1
x: 9
y: 95
z:0
 μ :0

MetroCar2
x: 4
y: 905
z:0
 μ :0



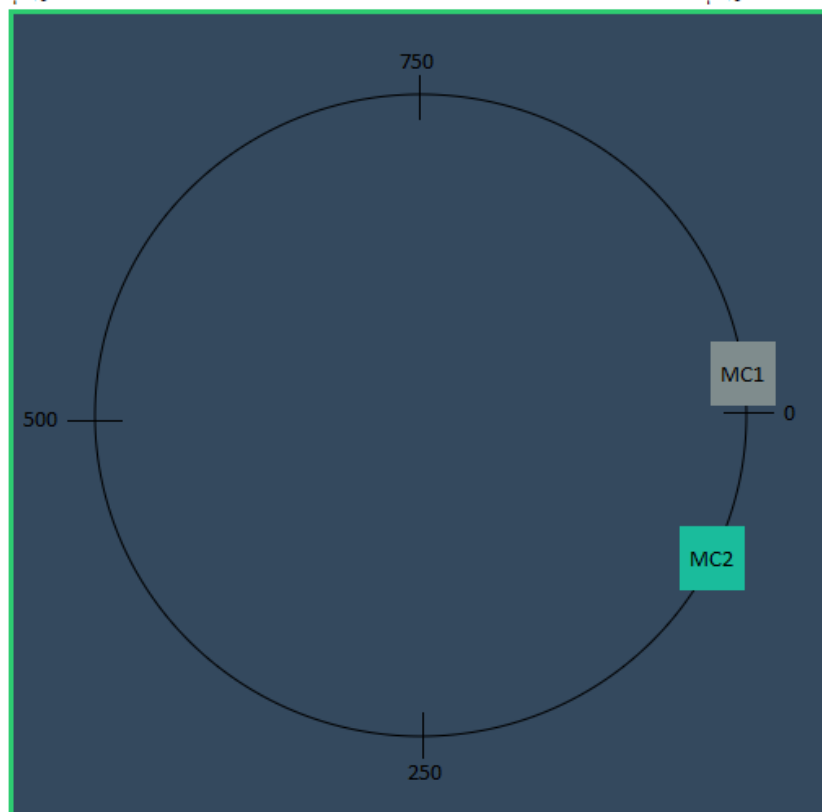
MetroCar1
x: 0
y: 48
z: 9
 μ : 0

MetroCar2
x: 2
y: 952
z: 0
 μ : 0



MetroCar1
x: 10
y: 94
z: 0
 μ : 0

MetroCar2
x: 6
y: 906
z: 0
 μ : 0



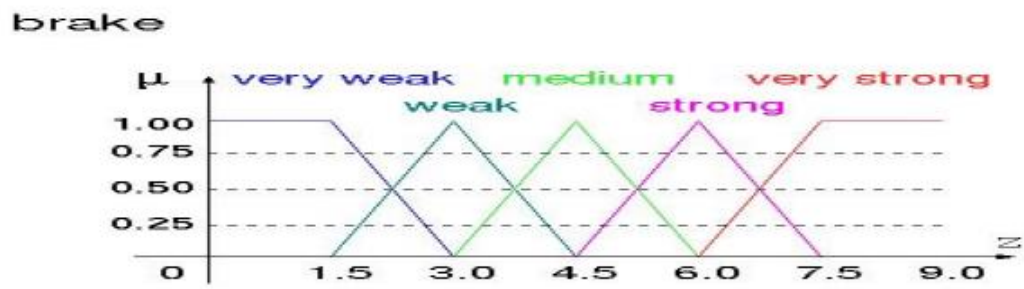


Figure 9: An example of 5 membership function for speed.

Why μ always in our case takes the value 0? This is because in this case the brake can take the values $\{0, 1, 9\}$, and predetermined rules $\text{brake} = \{\text{strong}, \text{medium}, \text{weak}\}$. From this it is seen that in this case is 0 μ .