



جامعة القاهرة

## Robotics Assignment

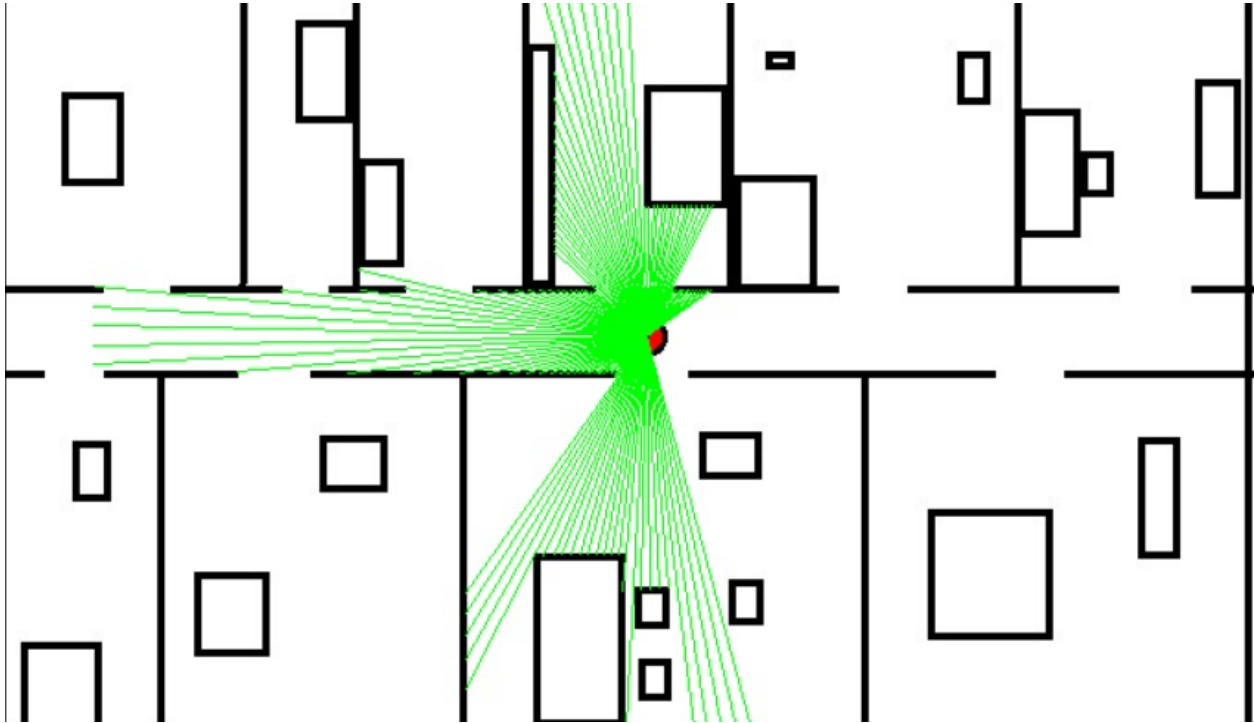
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## Req1 Results

Assume that the initial pose of the robot is at  $(x=350, y=185, \theta=200)$

So when we apply a ray casting the visualization of the robot will be



**Measures and endpoints measured in pixels**

**Measurements:**

Angle	Endpoint	Distance
75	(407, 398)	220.4948979001555
77	(399, 398)	218.56349191939628
79	(391, 398)	216.91011963483862
81	(383, 398)	215.5411793602327
83	(376, 398)	214.5809870421888
85	(362, 321)	136.5283853270081

87	(357, 321)	136.1800279042415
89	(352, 322)	137.01459776242822
91	(347, 322)	137.03284277865654
93	(339, 398)	213.283848427395
95	(337, 323)	138.61096637712328
97	(335, 303)	118.94956914591998
99	(331, 303)	119.5198728245642
101	(327, 303)	120.22063050907694
103	(323, 303)	121.0495766204905
105	(318, 303)	122.2620137246234
107	(314, 303)	123.36936410632909
109	(309, 303)	124.91997438360288
111	(304, 303)	126.64912159190051
113	(300, 303)	128.15615474880636
115	(294, 304)	131.51805959639154
117	(252, 376)	214.67417171145672
119	(252, 360)	200.57168294652163
121	(252, 347)	189.33568073662187
123	(252, 335)	179.17589123540031
125	(252, 324)	170.07351351694948
127	(333, 207)	27.80287754891569
129	(333, 206)	27.018512172212592
131	(333, 205)	26.248809496813376
133	(331, 205)	27.586228448267445
135	(331, 204)	26.870057685088806
137	(329, 204)	28.319604517012593
139	(327, 205)	30.479501308256342
141	(325, 205)	32.01562118716424
143	(324, 205)	32.802438933713454
145	(322, 205)	34.40930106817051
147	(319, 205)	36.89173349139343
149	(317, 205)	38.58756276314948

151	(314, 205)	41.182520563948
153	(311, 205)	43.829214001622255
155	(307, 205)	47.4236228055175
157	(303, 205)	51.07837115648854
159	(298, 205)	55.71355310873648
161	(292, 205)	61.35144660071187
163	(285, 205)	68.00735254367721
165	(276, 205)	76.6550715869472
167	(264, 205)	88.29496021857646
169	(249, 205)	102.96115772464877
171	(224, 205)	127.57742747053649
173	(188, 205)	163.22989922192565
175	(128, 204)	222.81157959136684
177	(50, 200)	300.0
179	(50, 190)	300.0
181	(50, 179)	300.0
183	(50, 169)	300.0
185	(51, 158)	300.0
187	(152, 160)	199.5720421301541
189	(195, 160)	157.00318468107582
191	(219, 159)	133.55523202031435
193	(194, 149)	160.099968769516
195	(258, 160)	95.33624704172071
197	(270, 160)	83.81527307120105
199	(279, 160)	75.27283706623525
201	(286, 160)	68.70953354520753
203	(292, 160)	63.15853069855251
205	(297, 160)	58.60034129593445
207	(302, 160)	54.120236510939236
209	(305, 160)	51.478150704935004
211	(309, 160)	48.02082881417188
213	(312, 160)	45.48626166217664

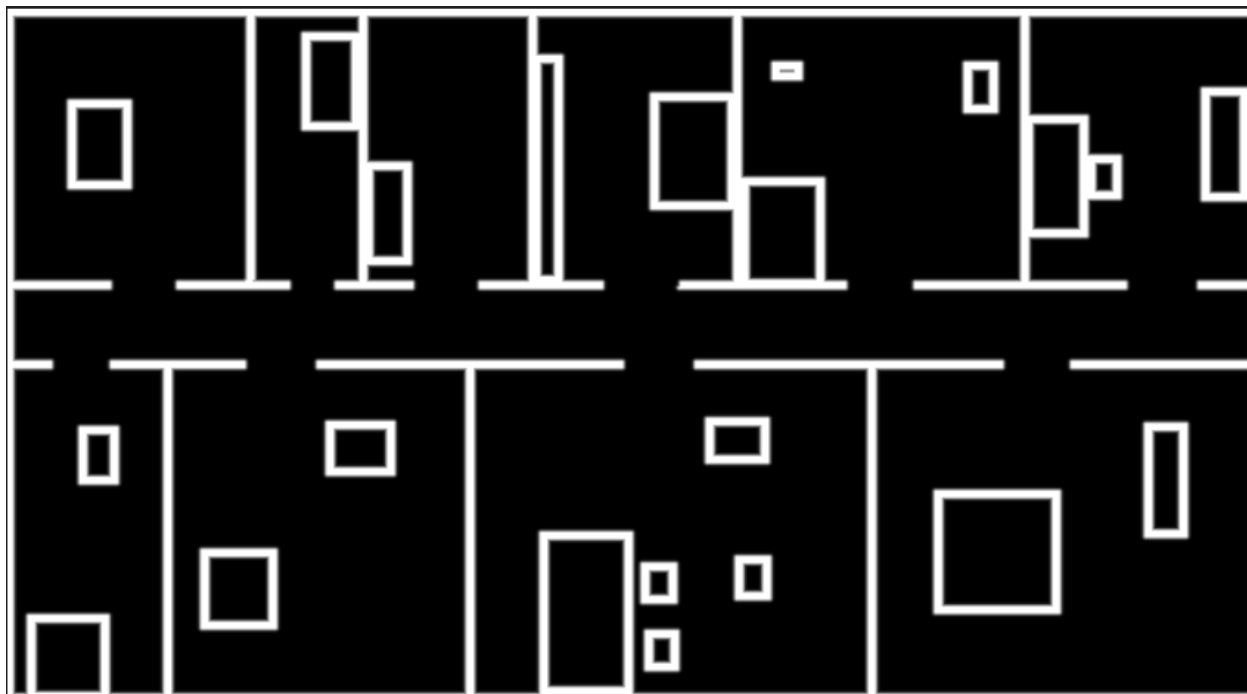
215	(315, 160)	43.01162633521314
217	(317, 160)	41.400483088968905
219	(320, 161)	38.41874542459709
221	(322, 161)	36.87817782917155
223	(300, 139)	67.94115100585212
225	(300, 135)	70.71067811865476
227	(300, 132)	72.86288492778748
229	(300, 128)	75.82216034906945
231	(300, 123)	79.64923100695951
233	(300, 119)	82.80096617793781
235	(300, 114)	86.83893136145792
237	(300, 109)	90.97252332435328
239	(300, 102)	96.89685237405806
241	(300, 96)	102.08329931972223
243	(300, 88)	109.12836478203089
245	(300, 79)	117.2006825918689
247	(300, 69)	126.31706139710502
249	(300, 56)	138.351002887583
251	(300, 42)	151.48927354766738
253	(294, 2)	191.3765920900464
255	(301, 2)	189.44656238633627
257	(307, 2)	187.98404187589966
259	(314, 2)	186.50737250843463
261	(321, 2)	185.28356645962967
263	(327, 2)	184.43969204051496
265	(333, 2)	183.7879212570837
267	(340, 2)	183.273020382161
269	(349, 115)	70.00714249274856
271	(351, 115)	70.00714249274856
273	(354, 114)	71.11258679024411
275	(356, 114)	71.25307010929424
277	(359, 114)	71.56814934033156

279	(361, 114)	71.84705978674423
281	(364, 114)	72.3671196055225
283	(366, 114)	72.78049189171504
285	(369, 114)	73.49829930005184
287	(372, 114)	74.33034373659252
289	(374, 114)	74.94664769020693
291	(377, 114)	75.96051605933177
293	(380, 114)	77.07788269017254
295	(383, 114)	78.29431652425353
297	(386, 114)	79.60527620704548
299	(365, 158)	30.886890422961002
301	(364, 161)	27.784887978899608
303	(366, 160)	29.68164415931166
305	(368, 160)	30.805843601498726
307	(369, 160)	31.400636936215164
309	(370, 160)	32.01562118716424
311	(372, 160)	33.301651610693426
313	(373, 160)	33.97057550292606
315	(375, 160)	35.35533905932738
317	(377, 160)	36.796738985948195
319	(379, 160)	38.28837943815329
321	(381, 160)	39.824615503479755
323	(383, 160)	41.400483088968905
325	(385, 160)	43.01162633521314

## Req2 Results

likelihood field at different sigmas

Sigma = 1



Sigma=5



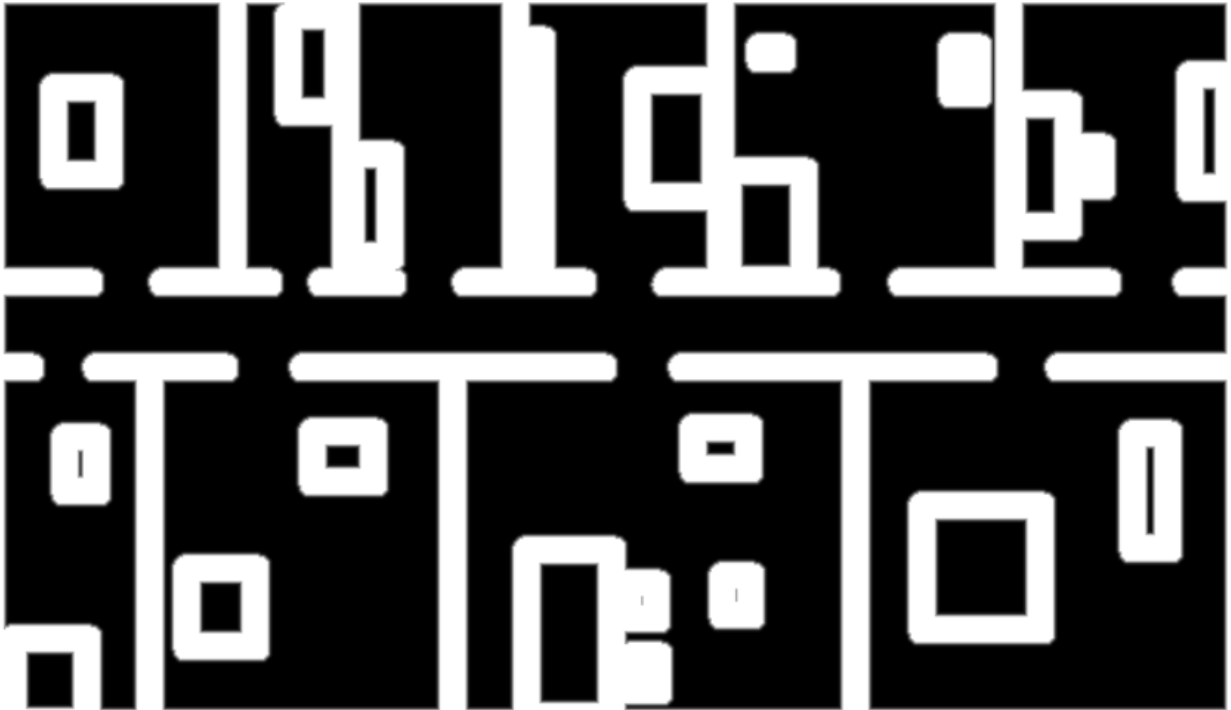
**Sigma=20**





## Probability map at different conditions

distance = 0.2m, sigma =1



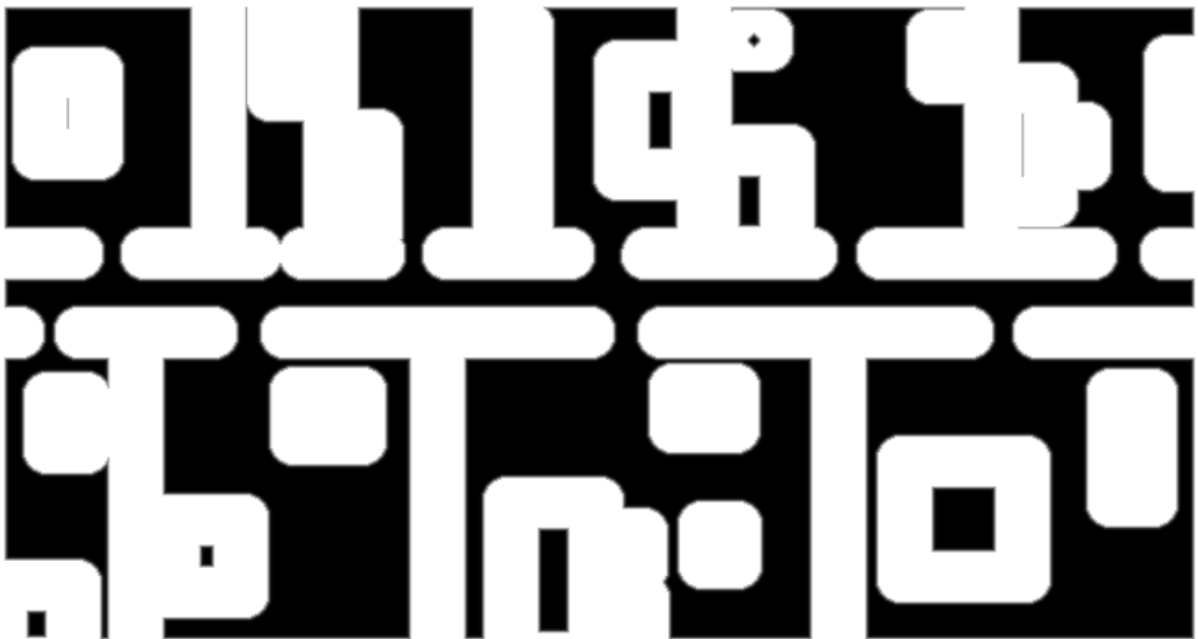
distance =0.2m , sigma =5



distance =0.2m , sigma =20



distance = 0.5m , sigma =1



**distance = 0.5m , sigma =5**

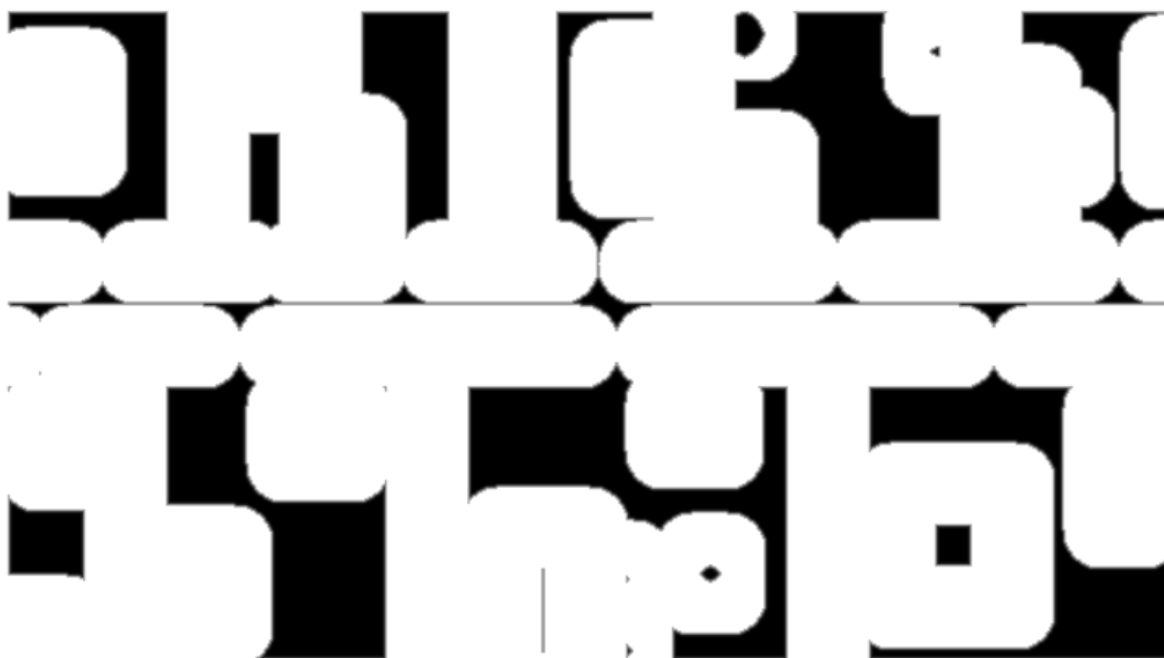


**distance = 0.5m , sigma =20**

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distance = 0.8m , sigma =1



distance = 0.8m , sigma =5



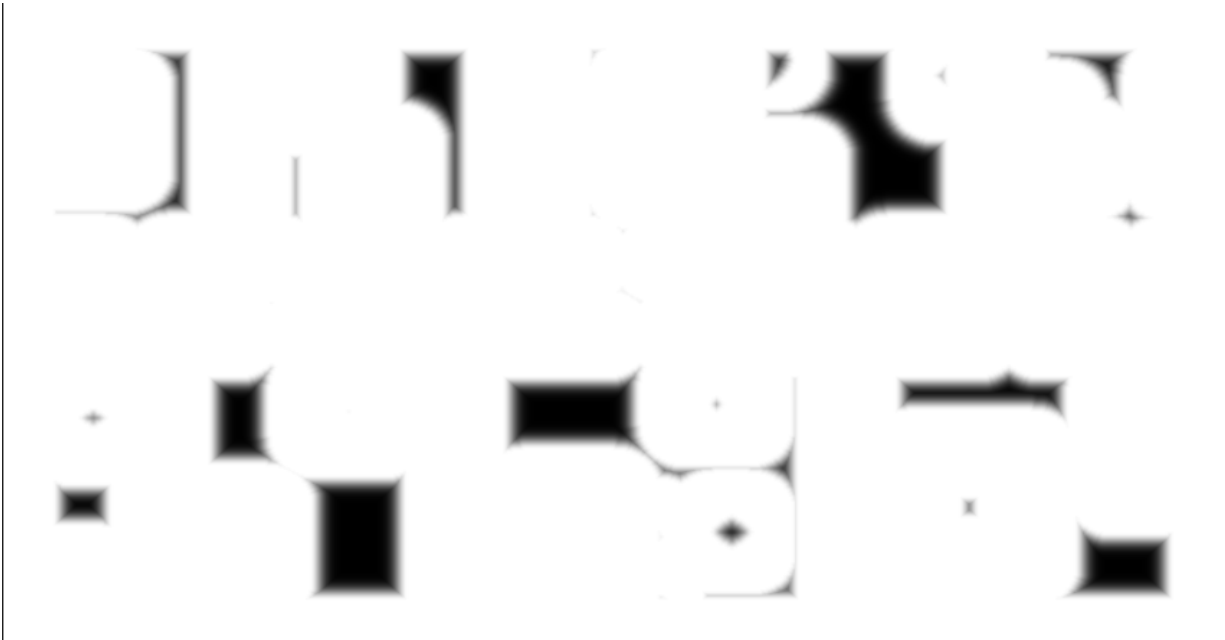
**distance = 0.8m , sigma =20**



**distance = 1m , sigma =1**



**distance = 1m , sigma =5**



**distance = 1m , sigma =20**



**distance = 2m , sigma =1**



**distance = 2m , sigma =5**



**distance = 2m , sigma =20**

**distance = 3m , sigma =1**

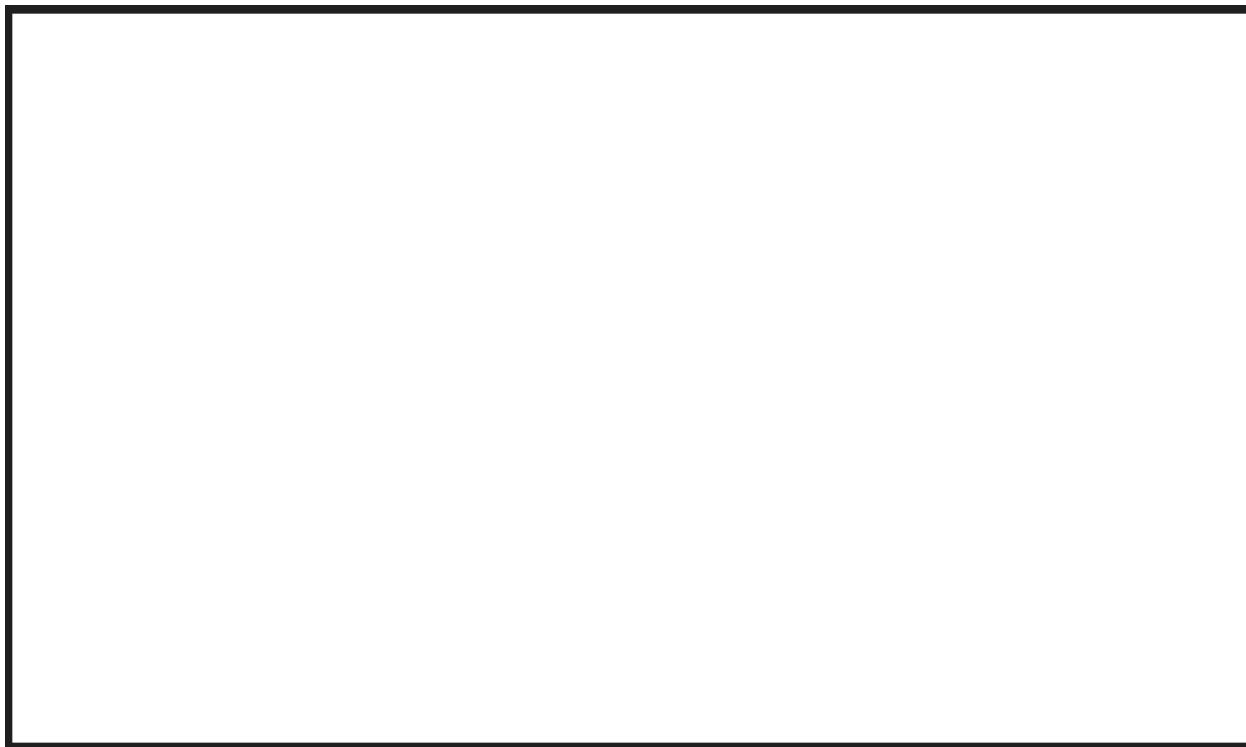




**distance = 3m , sigma =5**



**distance = 3m , sigma =20**



**Note :** all distances from 3m to 12m have the same result for the probability map which is a white image