

TEACHING COMPUTERS WITH ILLUSIONS

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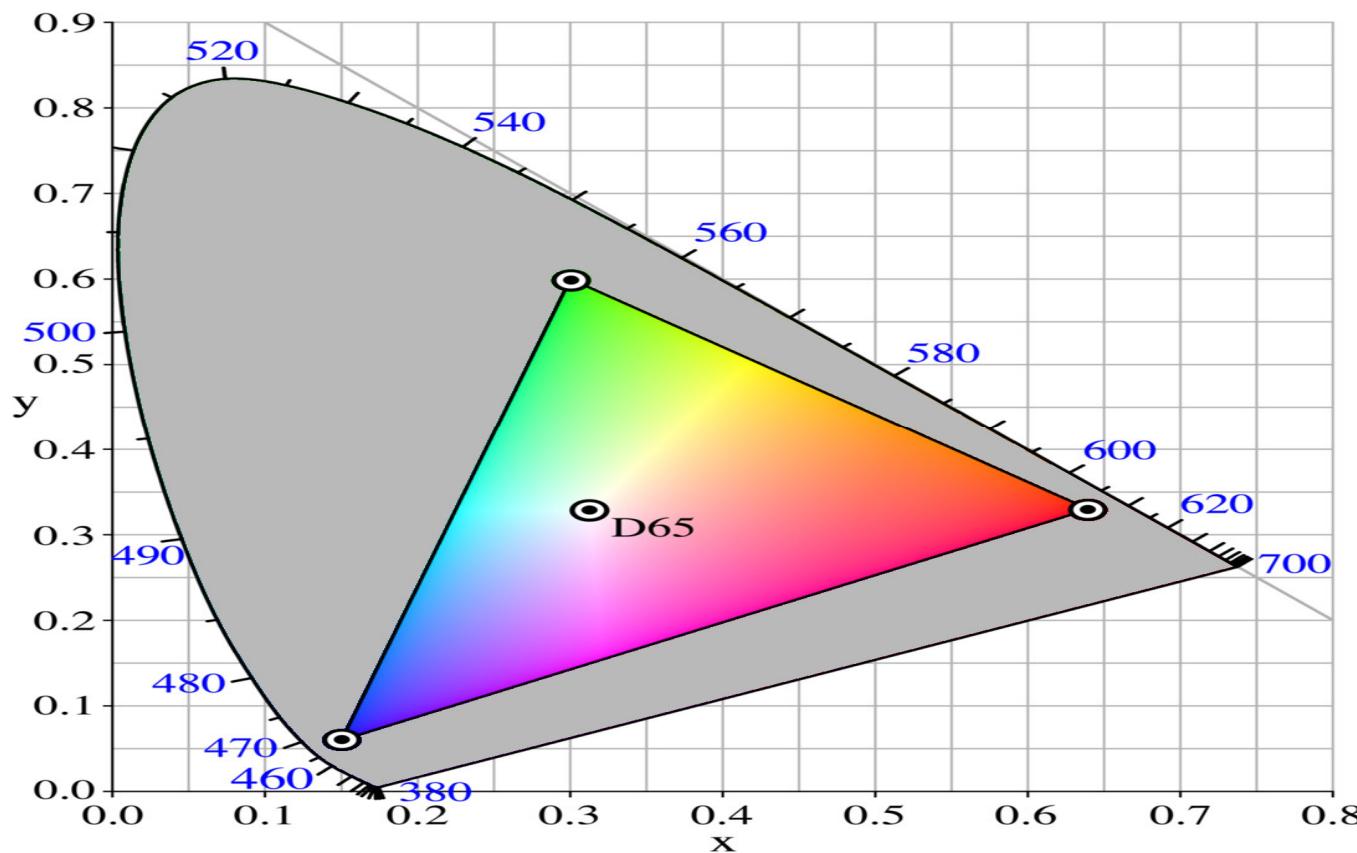
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- WHAT COLOUR IS THE DRESS?



- Human sees with biology, computer sees with physical measurements.
- Work needs to be done to teach computers.



- Robots should see like we do.
- Why? To understand us correctly and perform exactly as we want.





"that is a cat sitting in a bed"

" The boy is petting the elephant "



" those are people that are going on the airplane "





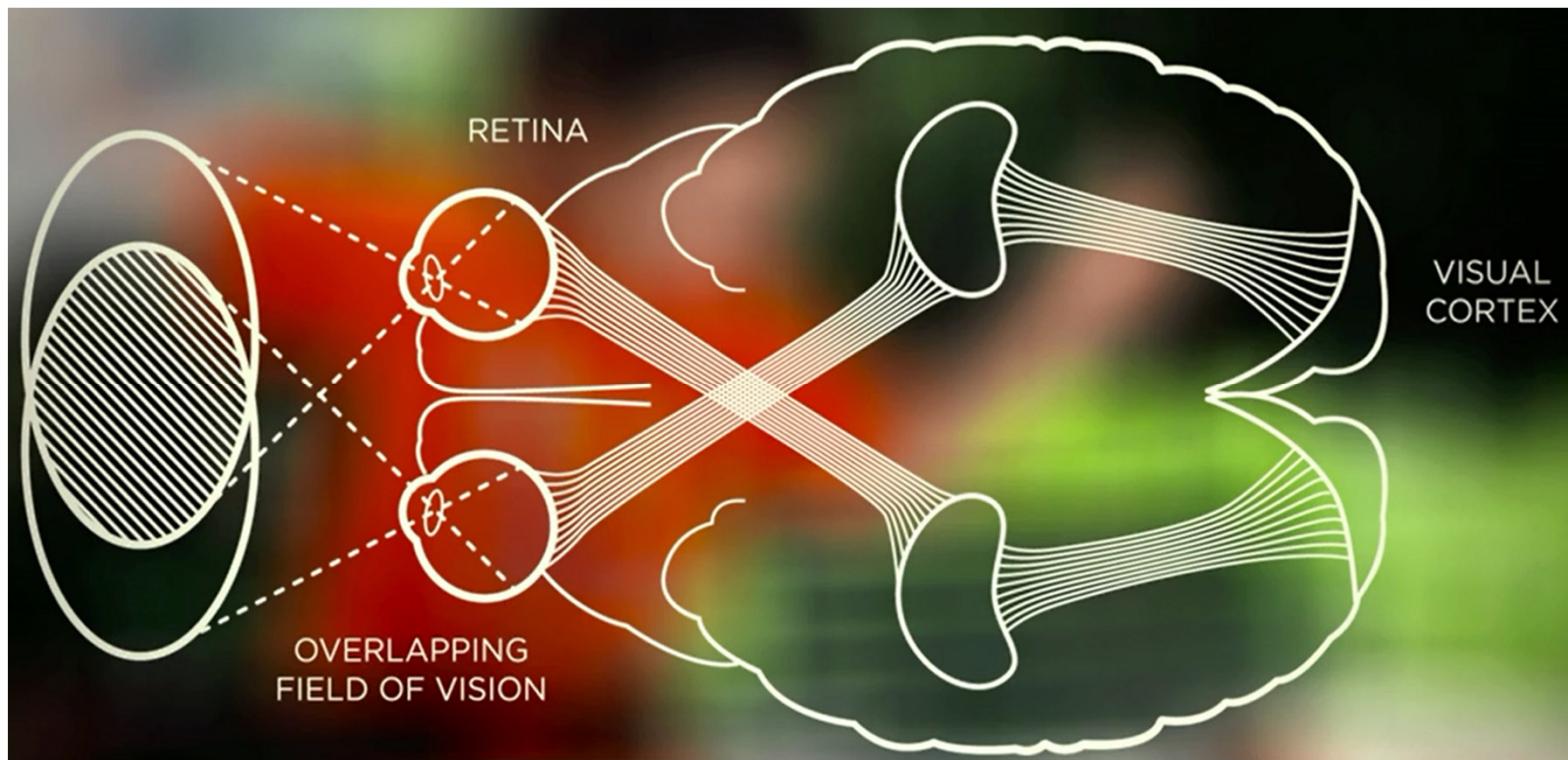
“ We have made famous megapixels cameras but we have not delivered sight to blind. “

example , security cameras are everywhere , but they do not alert us when a child is drowning in a swimming pool

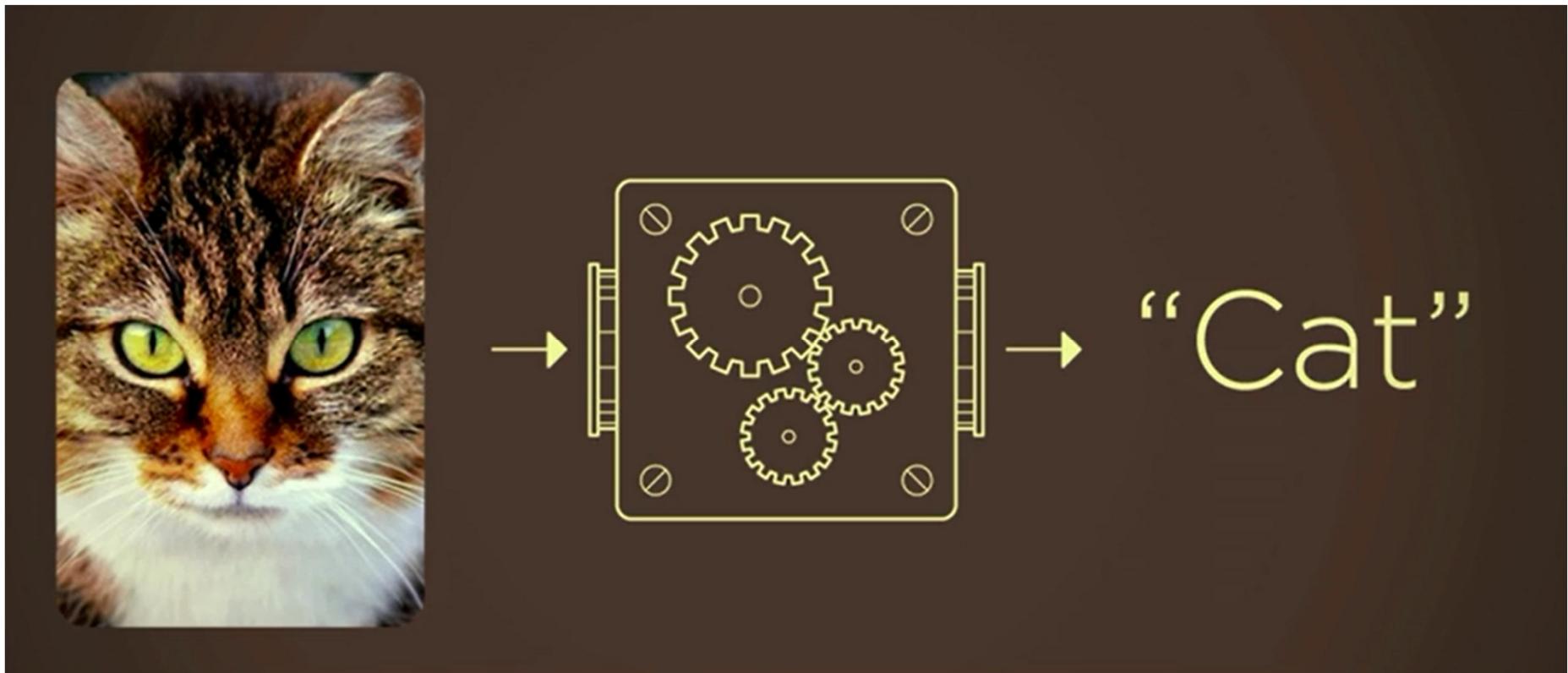
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58	24	134	93	114	50	38	178	163	127	211	176	39	12	88	191
23	10	140	196	193	223	29	240	25	53	234	232	125	88	70	141
54	7	126	101	194	118	64	108	155	58	53	170	173	72	219	234
224	89	234	149	185	106	252	0	222	118	41	70	193	25	10	86
6	89	54	236	46	55	207	162	198	76	71	18	41	96	136	13
20	131	173	254	166	198	148	44	80	56	126	63	118	52	216	81
143	171	194	205	197	132	125	208	127	29	179	232	109	210	50	10
86	49	90	220	162	41	28	153	96	240	191	186	179	38	57	51
138	90	179	39	42	34	100	246	215	134	39	40	253	167	201	93
116	250	142	106	139	5	222	39	200	150	110	60	125	118	201	18
182	144	96	42	152	216	166	248	176	243	224	76	242	52	224	58
244	117	62	183	80	34	117	125	81	203	77	224	201	167	30	141
142	148	161	241	131	159	188	232	73	134	199	45	109	74	27	250
66	158	244	9	253	149	152	64	108	57	61	192	22	111	73	10
206	19	90	68	185	138	228	107	143	114	10	31	8	238	68	47
29	43	186	2	214	174	33	253	183	181	202	139	173	102	5	72
170	1	170	64	110	247	244	118	163	203	137	2	63	208	64	131
98	34	92	145	14	122	35	111	85	255	55	43	99	198	143	254
226	88	133	62	140	212	235	45	238	83	100	32	46	63	104	151
219	46	170	76	58	213	126	66	61	154	96	122	29	9	205	164
71	106	191	194	78	147	224	190	179	39	103	61	238	108	95	148
98	145	27	125	53	38	189	224	23	239	68	145	245	249	160	161
25	200	201	88	21	160	159	237	82	183	14	236	68	153	250	140
126	182	37	225	118	180	195	118	143	123	189	247	116	181	24	50
167	194	188	101	96	194	143	140	103	2	204	87	88	207	11	36
205	127	184	108	241	66	10	174	128	13	5	185	66	248	147	36

Cameras takes pictures by converting lights into two

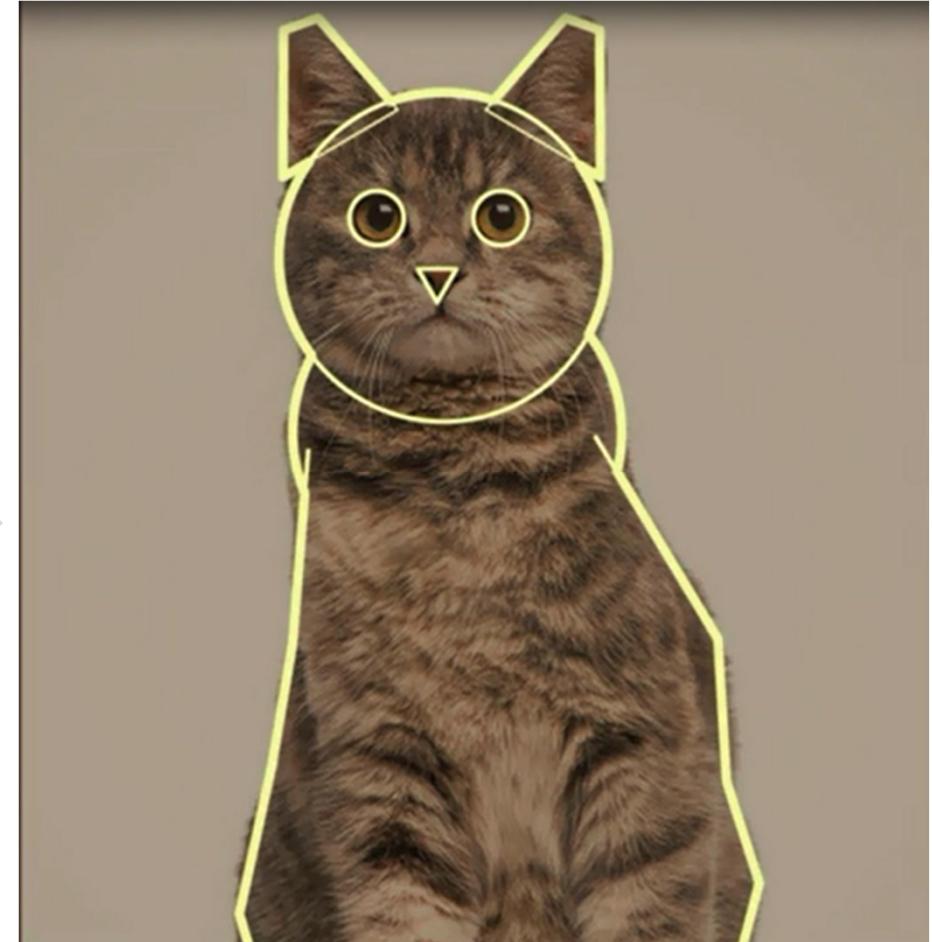
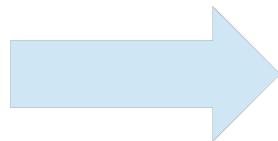
- just like to hear is not the same as to listen
- to take picture is not the same as to see



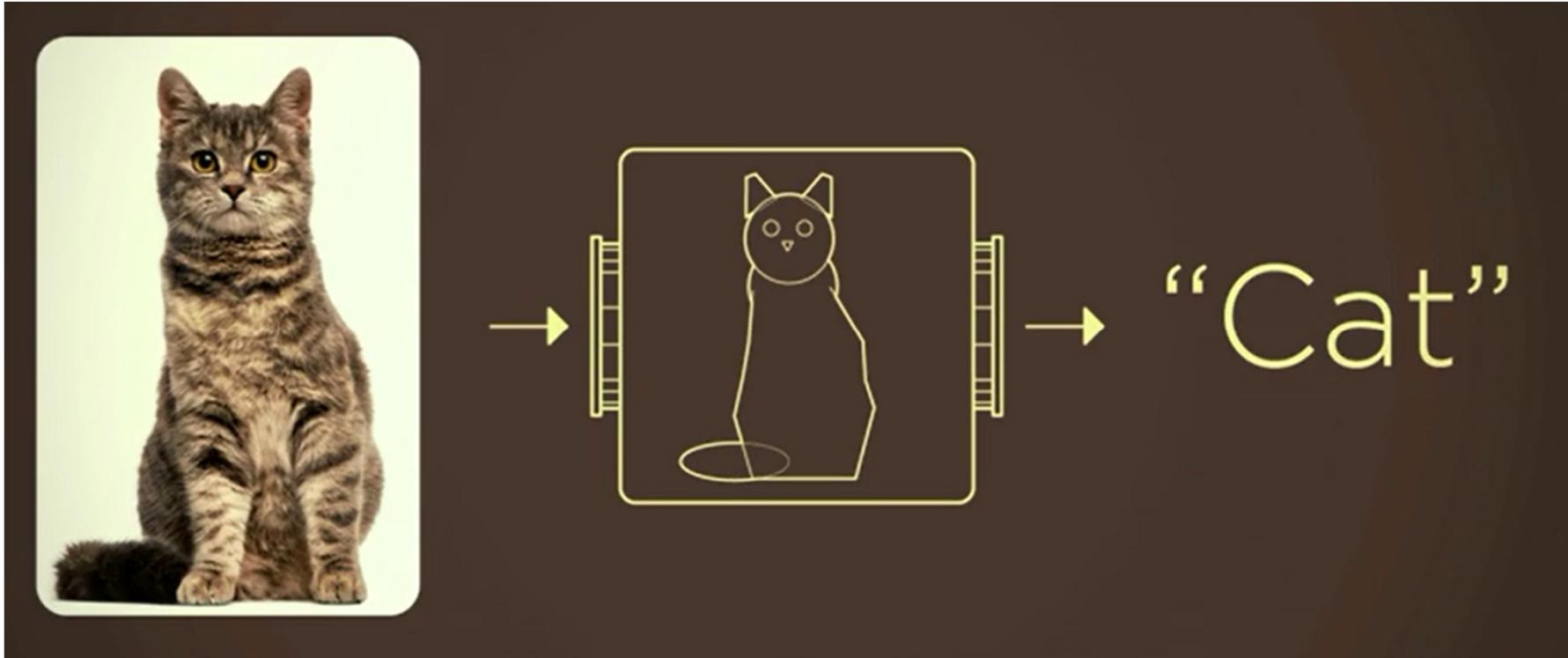
In fact that , it took 540 million years of hardwork to do this task and much of this effort went into developing the visual processing apparatus of brain.



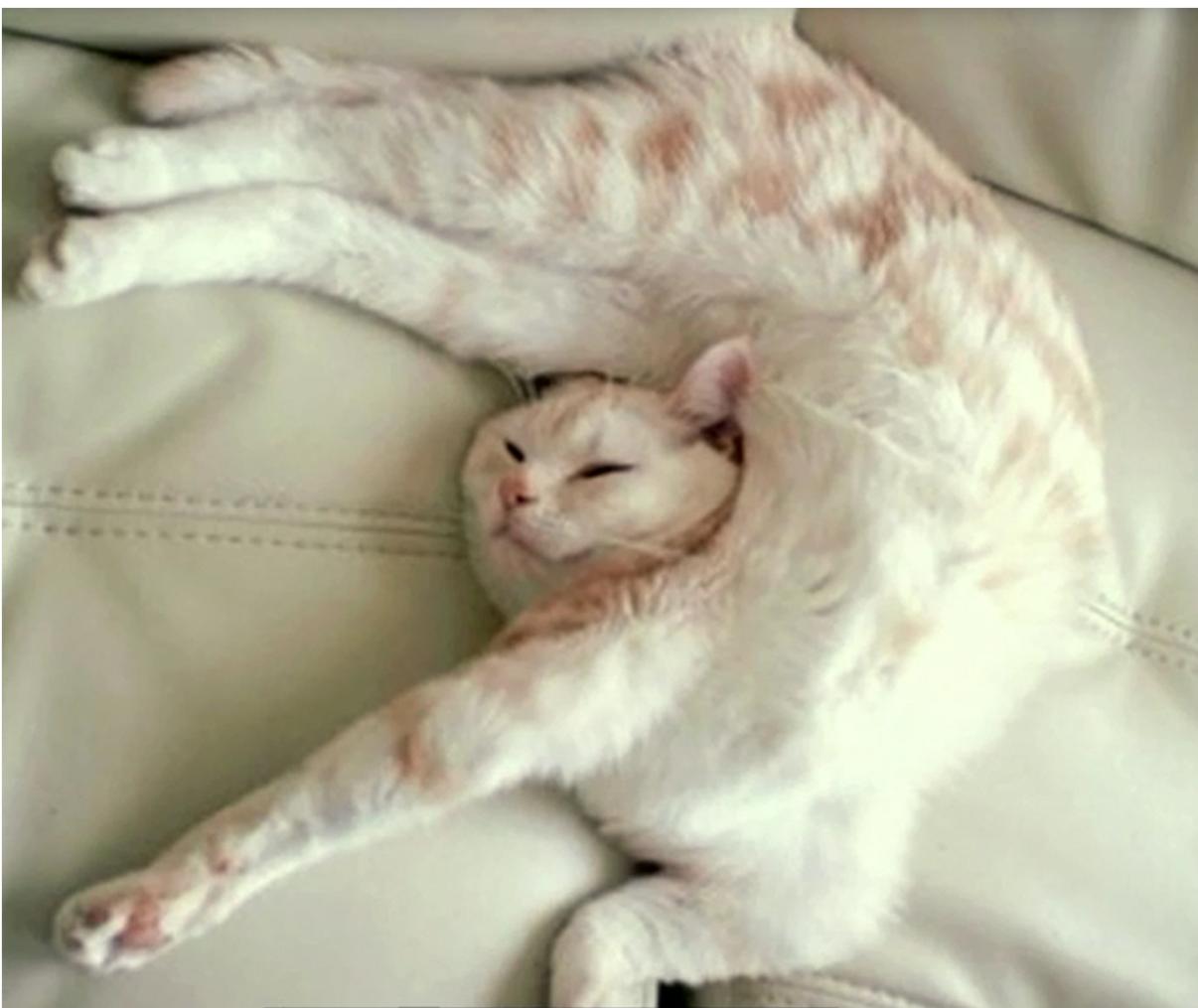
First step towards this goal is to teach a computer to see objects , the building block of the visual world.



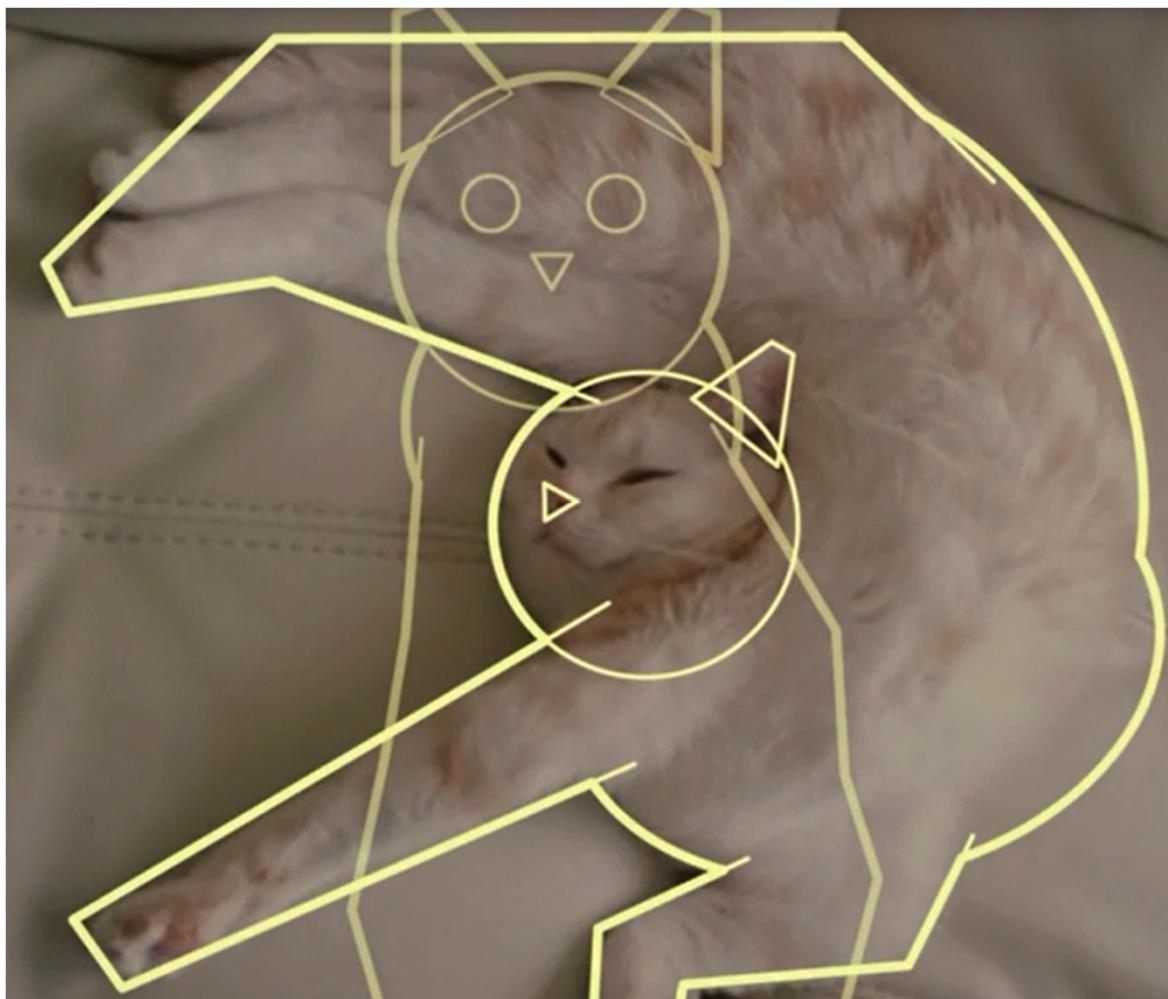
After all , a cat is just a collection of shapes and colors . . we tell the computer that a cat has a round face and chubbybody , two ears , and long tail.



Everything is OK ?



What about this cat ?



You have to add another shape and viewpoint to object model .

Can computer understand that yes, it is a cat ?



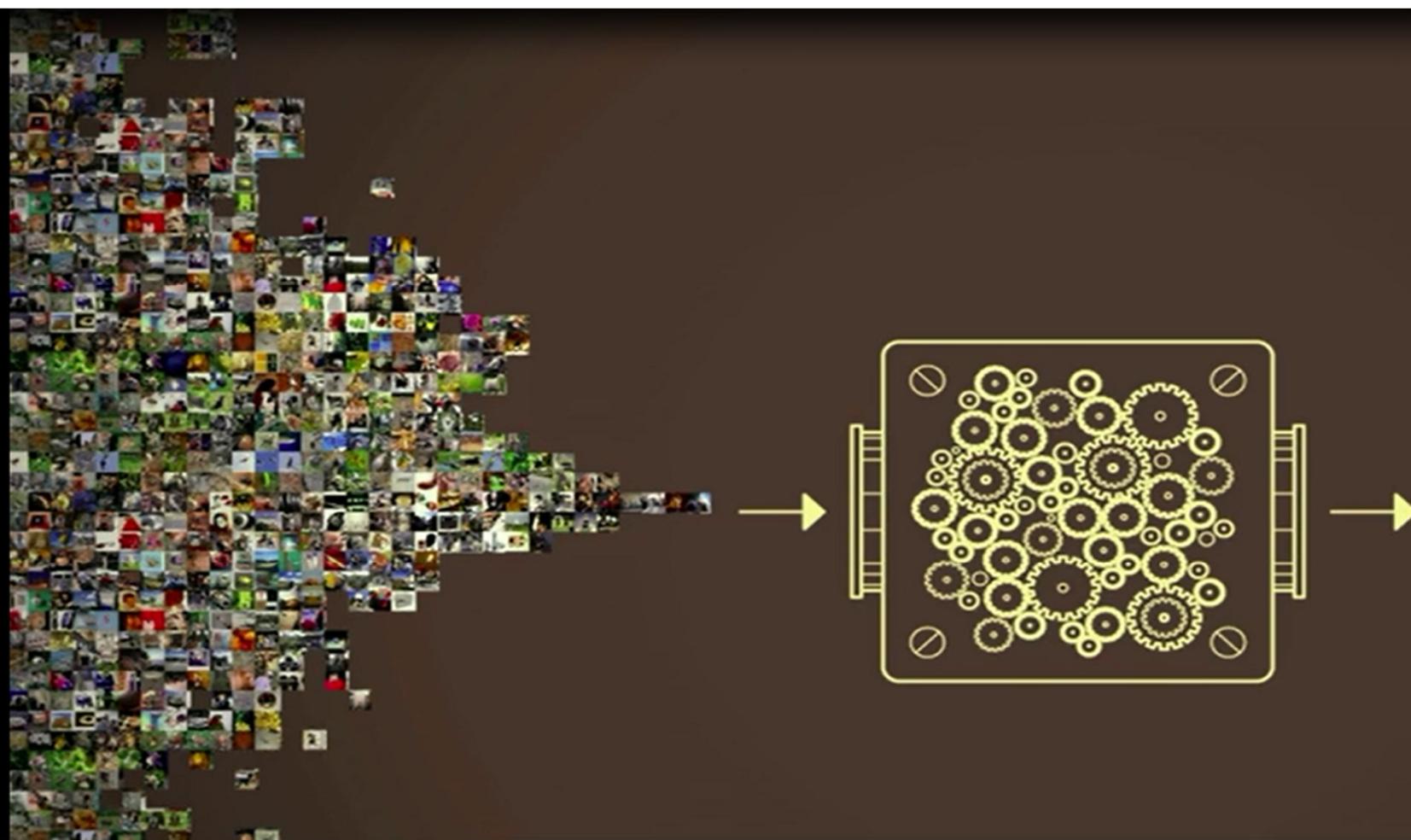
What about hidden cat ?



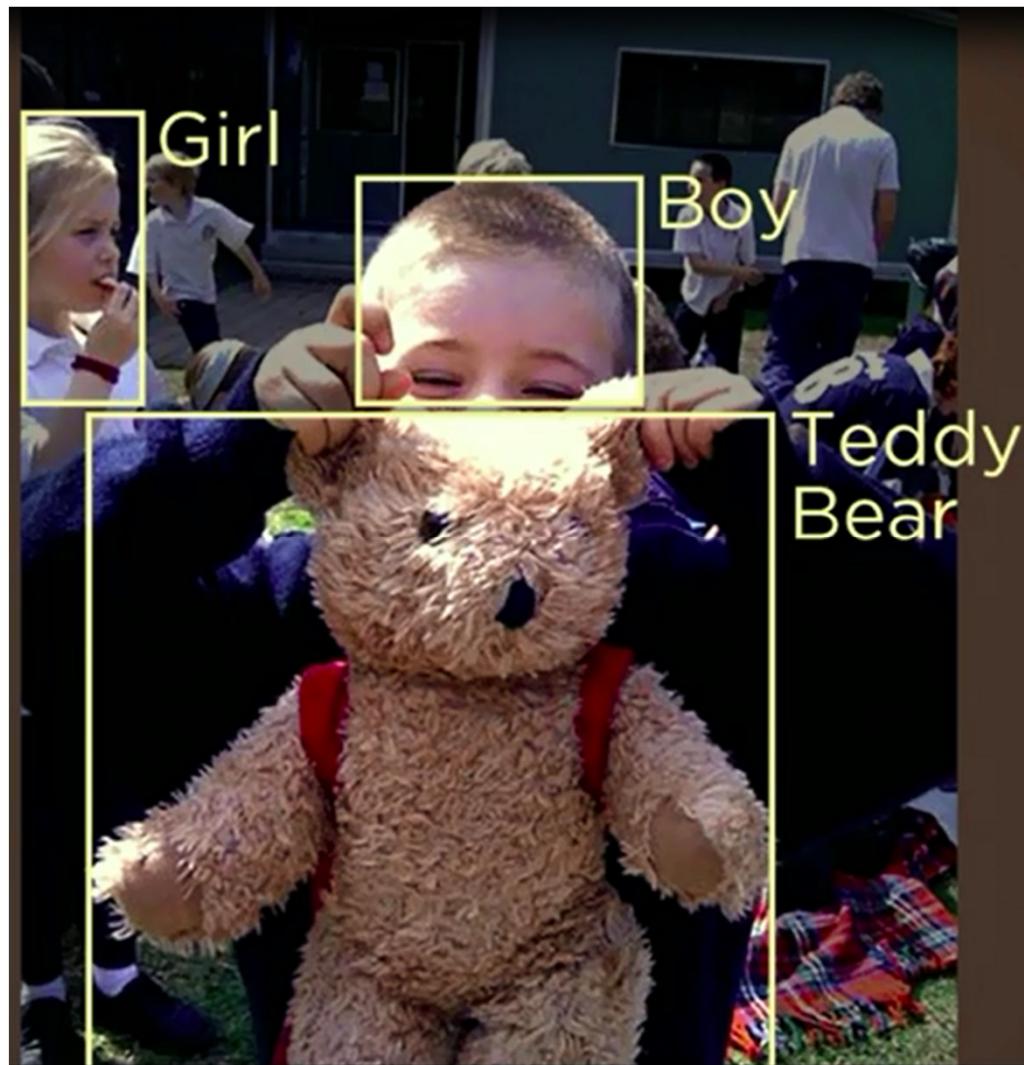
these silly cats ?



At 167 country , about 50 000 people helps to collect and clean data .

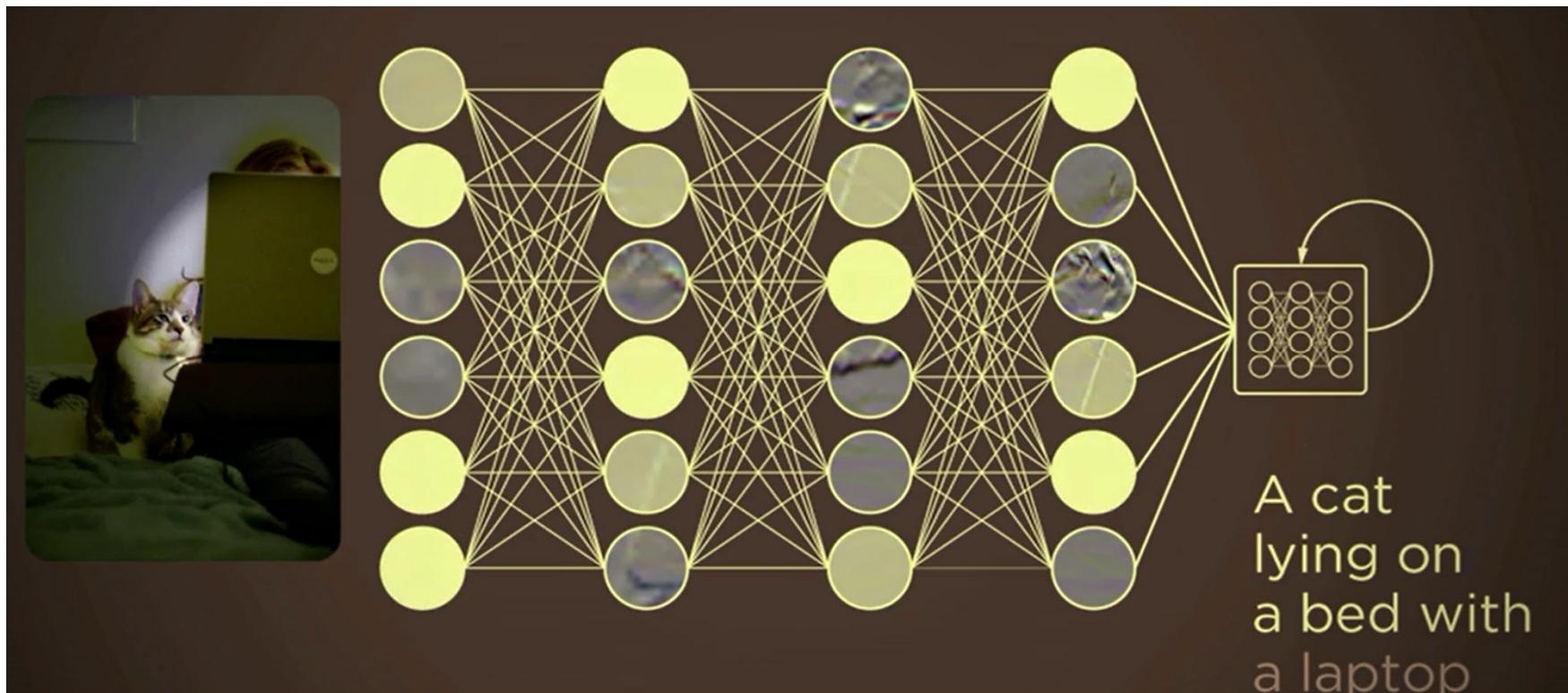


Imagenet project delivered a database of 15 million images in 2007.



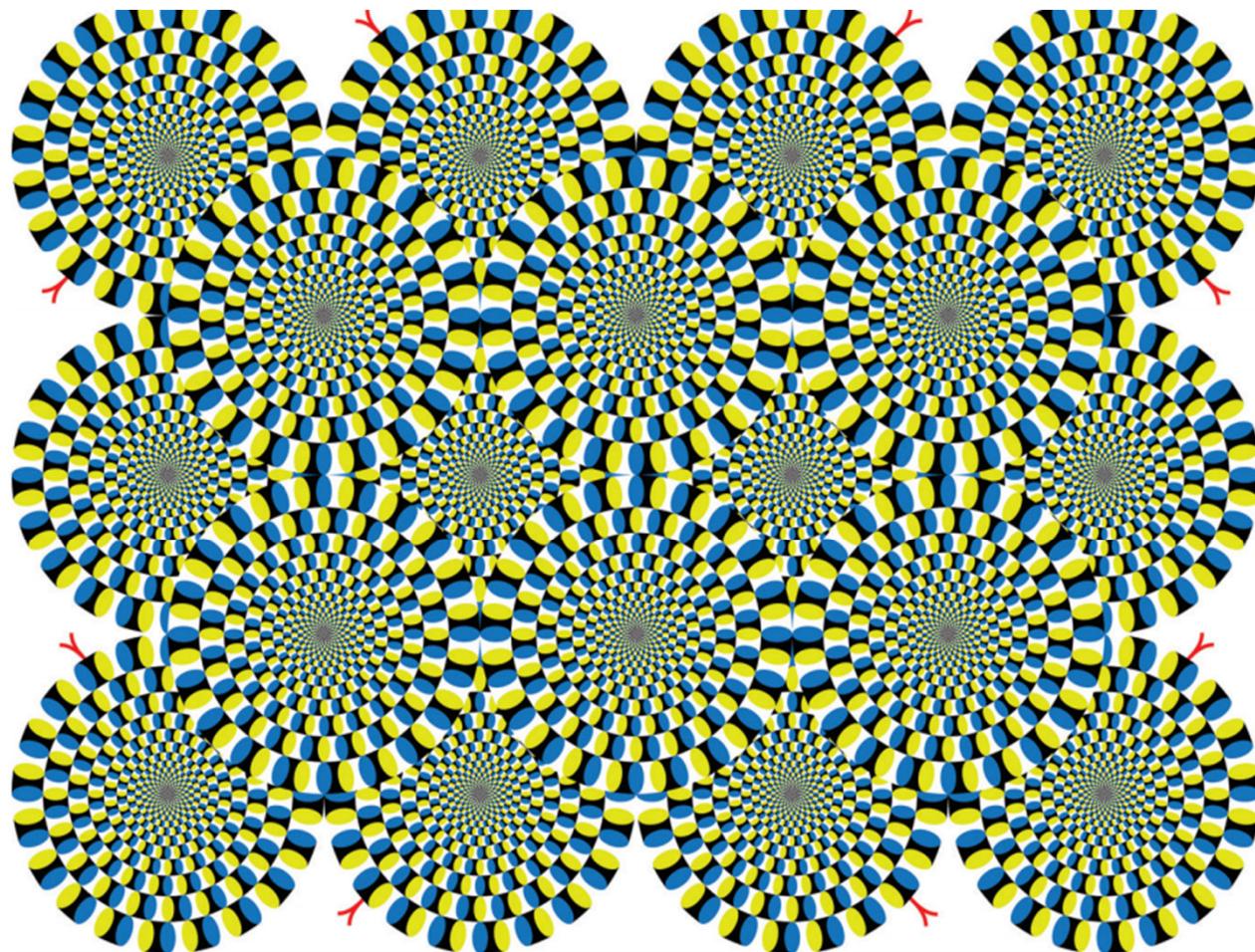
Here is a computer algorith tell us ; picture contains a boy and a teddy bear

With this result , the computer reach human ?



Computer says that , in this picture there is a cat .

Child says that , in this picture a cat lying on a bed with a laptop .



The rotating snakes illusion, as presented by Ritsumeikan University professor Akiyoshi Kitaoka.

Computer can realize this picture moving ?

- Machine vision is based on algorithms that can measure items in the environment and use them in driverless cars and elsewhere
- We have a very deep problem, being that we can't get at the physical world

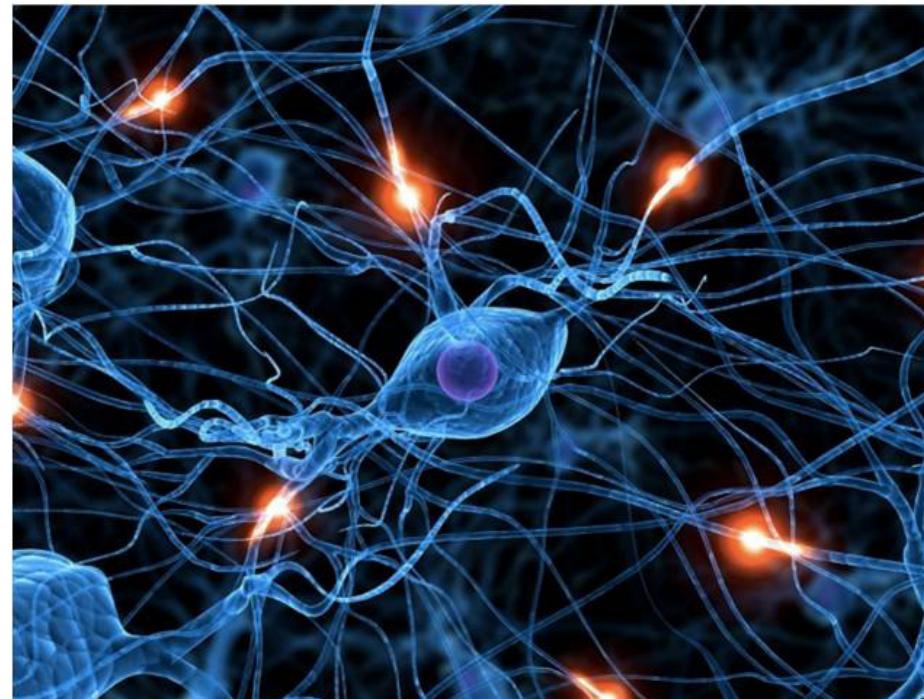
- A computer often fails to reconstruct a 3D shape from a projection drawing and delivers error messages, while humans can do this task very easily
- The computer examines every possibility in order to reconstruct a 3D object





Illusion by Kokichi Sugihara

- There are different methods that can be used to “fool” computer algorithms so what systems and humans see is more closely aligned. One way to enhance artificial vision is to further study what our brains see



- Humans have used natural selection to incorporate in the neural networks in our brains every conceivable situation in the world with visual input, says Purves. “Once computers do that and evolve, in principle they should be as good as us, but it won’t be in visual measurements; they’re coming at [vision] from a very different way. There’s going to be a limit that will never get them to the level at which human beings operate.”
- Yet machines can continue to be improved. “If you want to make a really good machine, evolve it” through trial-and-error experiences and by compiling those experiences in their artificial neural circuitry, says Purves. “There’s no reason that can’t be done; you just have to feed them the information that we used to evolve a visual system.” He estimates that in 20 years’ time, machine vision could be as good as human vision, once vision scientists are able to figure out how to evolve an artificial neural network to “survive” in environments “that are as complicated as the world we live in.”



For example, a pornography company may produce images that appear to Google's image filters like rabbits, but which contain advertisements with nudity; or, a terrorist group could get past artificial intelligence filters searching for text embedded in images by making those images appear to the AI as pictures of flowers, he explains. Biometric security features are also potentially vulnerable; "a terrorist could wear a mask of transparent plastic film that has static printed on it that is not visible to humans, but could trick a facial recognition system into seeing an authorized security agent instead of recognizing a known terrorist," Clune says.



There is no good way yet to prevent networks from being fooled by nefarious means, Clune says, but when the technology improves, “security holes will be closed and they’ll become smarter and more effective,” he says. “They’ll also do a better job when they encounter substantially different situations than they were trained on.” Today robots can be trained on one type of image from the natural world, but if they encounter images that are too different, they break down and behave in strange and bizarre ways, Clune says. “They need to be able to see the world and know what they’re looking at.”

