
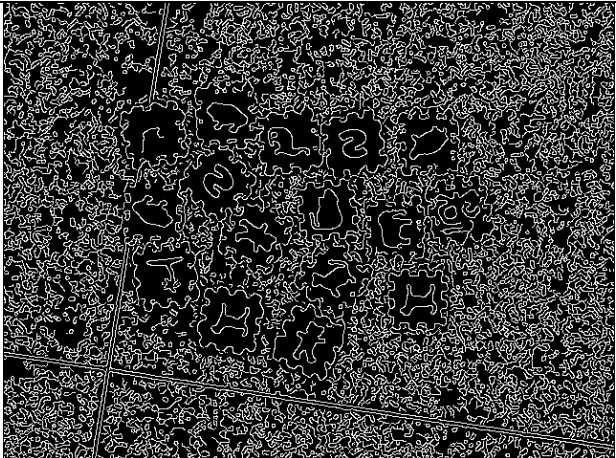
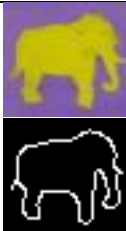





CMPT414 A2, Junsheng Pan, 301177231

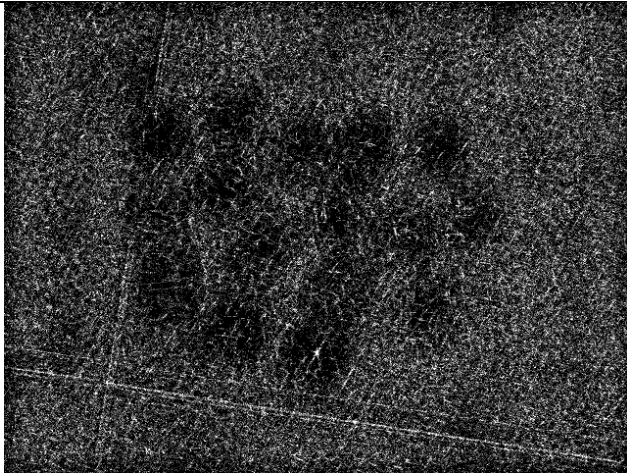
Animals.jpg

	Original	Edge(Canny)																																																																																																																																																																																																																																																																																																																																										
																																																																																																																																																																																																																																																																																																																																												
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<div> <div>Editor - q4.m</div> <div>Variables - accuArray</div> <div> <div>accuArray</div> <div>480x640 double</div> <table border="1"> <thead> <tr> <th></th> <th>405</th> <th>406</th> <th>407</th> <th>408</th> <th>409</th> <th>410</th> <th>411</th> <th>412</th> <th>413</th> <th>414</th> <th>415</th> <th>416</th> <th>417</th> <th></th> </tr> </thead> <tbody> <tr><td>227</td><td>1</td><td>1</td><td>1</td><td>1</td><td>0</td><td>3</td><td>0</td><td>1</td><td>0</td><td>1</td><td>0</td><td>1</td><td>1</td><td></td></tr> <tr><td>228</td><td>0</td><td>0</td><td>0</td><td>1</td><td>0</td><td>5</td><td>0</td><td>1</td><td>1</td><td>2</td><td>2</td><td>1</td><td>0</td><td></td></tr> <tr><td>229</td><td>1</td><td>0</td><td>0</td><td>0</td><td>0</td><td>3</td><td>1</td><td>1</td><td>0</td><td>0</td><td>0</td><td>0</td><td>0</td><td></td></tr> <tr><td>230</td><td>0</td><td>0</td><td>0</td><td>0</td><td>0</td><td>2</td><td>1</td><td>2</td><td>1</td><td>0</td><td>1</td><td>1</td><td>1</td><td></td></tr> <tr><td>231</td><td>0</td><td>0</td><td>0</td><td>0</td><td>0</td><td>0</td><td>1</td><td>5</td><td>0</td><td>0</td><td>0</td><td>1</td><td>0</td><td></td></tr> <tr><td>232</td><td>0</td><td>0</td><td>0</td><td>0</td><td>0</td><td>0</td><td>2</td><td>7</td><td>0</td><td>0</td><td>0</td><td>0</td><td>0</td><td></td></tr> <tr><td>233</td><td>0</td><td>0</td><td>0</td><td>0</td><td>0</td><td>1</td><td>3</td><td>5</td><td>0</td><td>1</td><td>1</td><td>0</td><td>0</td><td></td></tr> <tr><td>234</td><td>0</td><td>0</td><td>0</td><td>0</td><td>0</td><td>2</td><td>7</td><td>6</td><td>1</td><td>1</td><td>0</td><td>1</td><td>1</td><td></td></tr> <tr><td>235</td><td>4</td><td>1</td><td>3</td><td>3</td><td>4</td><td>7</td><td>18</td><td>19</td><td>6</td><td>6</td><td>3</td><td>1</td><td>1</td><td></td></tr> <tr><td>236</td><td>4</td><td>3</td><td>3</td><td>2</td><td>8</td><td>20</td><td>58</td><td>88</td><td>21</td><td>7</td><td>4</td><td>0</td><td>2</td><td></td></tr> <tr><td>237</td><td>2</td><td>4</td><td>3</td><td>6</td><td>4</td><td>10</td><td>21</td><td>18</td><td>8</td><td>5</td><td>2</td><td>1</td><td>1</td><td></td></tr> <tr><td>238</td><td>1</td><td>1</td><td>2</td><td>0</td><td>1</td><td>2</td><td>5</td><td>7</td><td>1</td><td>0</td><td>1</td><td>1</td><td>1</td><td></td></tr> <tr><td>239</td><td>0</td><td>0</td><td>0</td><td>0</td><td>0</td><td>1</td><td>4</td><td>3</td><td>1</td><td>0</td><td>0</td><td>0</td><td>0</td><td></td></tr> <tr><td>240</td><td>1</td><td>1</td><td>0</td><td>0</td><td>0</td><td>0</td><td>2</td><td>1</td><td>2</td><td>0</td><td>0</td><td>0</td><td>0</td><td></td></tr> <tr><td>241</td><td>0</td><td>0</td><td>0</td><td>0</td><td>0</td><td>0</td><td>2</td><td>0</td><td>1</td><td>0</td><td>0</td><td>0</td><td>0</td><td></td></tr> <tr><td>242</td><td>0</td><td>0</td><td>1</td><td>0</td><td>0</td><td>0</td><td>1</td><td>1</td><td>3</td><td>2</td><td>1</td><td>1</td><td>0</td><td></td></tr> <tr><td>243</td><td>0</td><td>1</td><td>1</td><td>1</td><td>0</td><td>0</td><td>1</td><td>1</td><td>2</td><td>0</td><td>0</td><td>0</td><td>0</td><td></td></tr> <tr><td>244</td><td>0</td><td>0</td><td>1</td><td>3</td><td>2</td><td>2</td><td>1</td><td>3</td><td>1</td><td>1</td><td>1</td><td>0</td><td>2</td><td></td></tr> <tr><td>245</td><td>3</td><td>4</td><td>2</td><td>1</td><td>1</td><td>0</td><td>1</td><td>4</td><td>4</td><td>0</td><td>1</td><td>2</td><td>3</td><td></td></tr> <tr><td>246</td><td>0</td><td>0</td><td>0</td><td>1</td><td>1</td><td>1</td><td>0</td><td>1</td><td>5</td><td>1</td><td>3</td><td>2</td><td>2</td><td></td></tr> <tr><td>247</td><td>0</td><td>1</td><td>0</td><td>0</td><td>0</td><td>0</td><td>0</td><td>0</td><td>5</td><td>0</td><td>3</td><td>1</td><td>0</td><td></td></tr> </tbody> </table> </div> </div>				405	406	407	408	409	410	411	412	413	414	415	416	417		227	1	1	1	1	0	3	0	1	0	1	0	1	1		228	0	0	0	1	0	5	0	1	1	2	2	1	0		229	1	0	0	0	0	3	1	1	0	0	0	0	0		230	0	0	0	0	0	2	1	2	1	0	1	1	1		231	0	0	0	0	0	0	1	5	0	0	0	1	0		232	0	0	0	0	0	0	2	7	0	0	0	0	0		233	0	0	0	0	0	1	3	5	0	1	1	0	0		234	0	0	0	0	0	2	7	6	1	1	0	1	1		235	4	1	3	3	4	7	18	19	6	6	3	1	1		236	4	3	3	2	8	20	58	88	21	7	4	0	2		237	2	4	3	6	4	10	21	18	8	5	2	1	1		238	1	1	2	0	1	2	5	7	1	0	1	1	1		239	0	0	0	0	0	1	4	3	1	0	0	0	0		240	1	1	0	0	0	0	2	1	2	0	0	0	0		241	0	0	0	0	0	0	2	0	1	0	0	0	0		242	0	0	1	0	0	0	1	1	3	2	1	1	0		243	0	1	1	1	0	0	1	1	2	0	0	0	0		244	0	0	1	3	2	2	1	3	1	1	1	0	2		245	3	4	2	1	1	0	1	4	4	0	1	2	3		246	0	0	0	1	1	1	0	1	5	1	3	2	2		247	0	1	0	0	0	0	0	0	5	0	3	1	0	
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bear



Accumulator Array Image(S:1,R:330)



Detection(S:1,R:330)



Accumulator Array Peak(S:1,R:330)

accuArray

480x640 double


	314	315	316	317	318	319	320	321	322	323	324	325	326	
349	0	0	1	0	0	1	0	0	0	1	1	2	1	
350	0	3	1	0	0	1	0	0	0	0	4	1	0	
351	0	0	0	0	0	0	0	0	0	0	1	1	0	
352	0	0	0	0	0	0	1	0	1	0	0	1	0	
353	0	0	0	0	0	0	3	0	2	5	3	2	0	
354	0	0	0	0	0	1	3	2	3	5	1	0	0	
355	0	0	0	0	0	1	3	2	2	2	0	0	0	
356	1	3	0	0	2	2	8	9	6	0	0	0	0	
357	1	0	2	5	4	7	26	21	1	2	0	1	0	
358	0	0	1	0	3	16	40	22	1	1	0	1	0	
359	0	0	0	0	1	6	20	18	2	1	1	0	0	
360	0	0	0	1	3	8	4	6	3	0	0	0	0	
361	0	0	1	4	2	3	2	2	2	0	0	0	0	
362	0	0	0	2	0	1	1	4	1	0	1	0	0	
363	0	0	1	4	2	0	0	4	0	0	0	1	0	
364	0	0	5	4	0	0	0	2	2	0	0	0	1	
365	1	1	5	1	0	0	0	0	2	2	0	2	0	
366	0	2	0	1	0	0	0	1	1	0	1	0	0	
367	4	2	1	0	0	0	0	0	0	0	2	0	0	
368	1	1	0	0	0	0	0	0	2	1	1	0	0	
369	2	0	0	1	0	0	0	2	1	2	1	0	0	

Notes

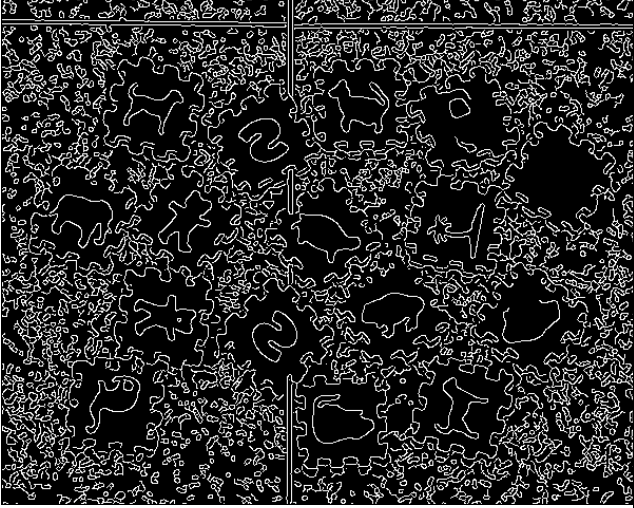
In “animals.jpg”, both “bear” & “elephant” template is matched by first estimating the rotation angle. No scale is needed in this matching.

“S:1.R:330” means, scaling factor = 1, rotation angle = 330 degree CCW.

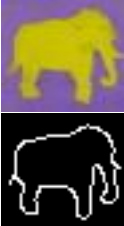
Original



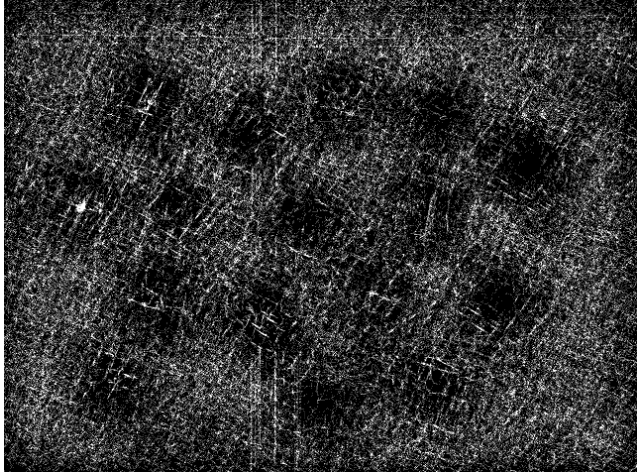
Edge(Canny)




elephant



Accumulator Array Image(S:1.3,R:330)





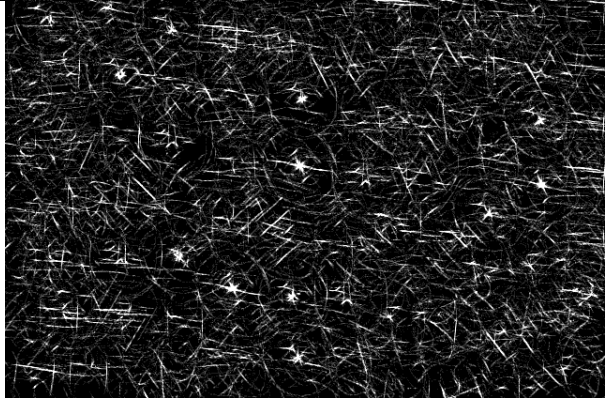

Detection(S:1.3,R:330)



Accumulator Array Peak(S:1.3,R:330)

	75	76	77	78	79	80	81	82	83	84	85	86	87	
203	0	2	2	1	0	0	0	2	1	2	0	3	1	
204	0	3	2	0	0	1	1	3	0	0	1	1	0	
205	1	0	1	0	1	1	2	3	0	3	3	0	0	
206	1	0	0	2	0	1	4	3	0	1	2	0	0	
207	2	1	3	1	0	3	3	5	3	2	1	0	0	
208	0	0	3	5	0	2	5	5	1	1	0	0	0	
209	0	1	1	1	3	4	4	4	3	2	1	0	1	
210	1	4	3	4	4	6	8	4	3	0	0	0	0	
211	5	3	3	3	5	7	10	8	1	1	0	0	0	
212	6	6	6	5	10	18	17	8	0	0	0	2	0	
213	7	4	5	4	16	17	11	6	1	0	0	1	1	
214	5	3	2	6	16	11	6	5	3	0	0	0	2	
215	8	5	5	4	8	9	3	1	1	1	2	2	3	
216	4	7	8	7	7	5	2	2	0	0	0	1	0	
217	2	5	3	3	2	2	1	0	2	1	0	0	1	
218	0	2	2	2	3	0	0	0	0	0	1	0	0	
219	2	0	0	2	0	0	0	0	0	2	1	2	1	
220	1	1	3	1	0	2	0	0	1	1	1	1	1	
221	1	3	2	2	1	2	0	0	2	0	1	0	0	
222	3	1	3	0	1	0	0	0	1	2	0	0	0	
223	2	1	1	1	0	0	0	0	0	1	2	0	0	

	Original	Edge(Canny)																																																																																																																																																																																																																																																																																																																																																																										
																																																																																																																																																																																																																																																																																																																																																																												
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177	2	2	4	5	13	52	85	61	20	7	3	2	1																																																																																																																																																																																																																																																																																																									
178	1	2	4	18	32	54	70	50	31	17	16	14	11																																																																																																																																																																																																																																																																																																									
179	2	7	16	30	30	27	20	14	15	10	9	11	14																																																																																																																																																																																																																																																																																																									
180	2	9	14	14	9	8	14	10	9	9	2	3	2																																																																																																																																																																																																																																																																																																									
181	4	4	4	3	1	2	5	3	6	7	4	0	0																																																																																																																																																																																																																																																																																																									
182	2	1	2	3	1	0	6	1	1	4	5	0	0																																																																																																																																																																																																																																																																																																									
183	2	0	1	1	0	0	6	0	2	1	6	2	1																																																																																																																																																																																																																																																																																																									
184	1	3	1	0	0	1	4	0	0	1	3	5	4																																																																																																																																																																																																																																																																																																									
185	0	1	1	2	1	1	2	1	2	1	3	6	5																																																																																																																																																																																																																																																																																																									
186	0	0	0	0	0	0	0	0	0	1	4	4	4																																																																																																																																																																																																																																																																																																									
187	0	0	0	0	0	0	1	1	4	1	3	2	3																																																																																																																																																																																																																																																																																																									

Notes

In “letters”, both “K” & “Q” almost in the upright orientation. No scale is needed in this matching. In order to match multiple K&Q, I found that they’re differed by rotating a few degrees away from 0. Thus, I used a series of rotation of angles to matching all occurrences.

“S:1,R: (-10:8:9)” means,

scaling factor = 1,

rotation angle = from -10 to 8 degree CCW : {-10-7.75 -5.5 -3.25 -1 1.25 3.5 5.75 8}