

Ain Shams University Faculty Of Engineering

CSE 365 Computer Vision OCR Final Project

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Contents

Solution :	4
Steps to reach the output :	
Test Cases 1:	10
Output for testcase 1:	11
Test Case 2:	13
Test Case 2 Output :	14
Test Case 3:	16
Test Case 3 Output :	17

List of Figures:

Figure 1 Test Sample 1	10
Figure 2 Test Case 1 Output File	11
Figure 3 Test Case 1 Output File (Cont.)	12
Figure 4 Test Sample 2	13
Figure 5 Test Case 2 Output File	14
Figure 6 Test Case 2 Output File (Cont.)	15
Figure 7 Test Sample 3	16
Figure 8 Test Case 3 Output File	17
Figure 9 Test Case 3 Output File (Cont.)	18

Solution:

```
import cv2
import numpy as np
import math
def rotateImage(image, angle): # image rotation function by calculating the center of
    image_center = tuple(np.array(image.shape[1::-1]) / 2) # calculating the center
    rot mat = cv2.getRotationMatrix2D(image center, angle, 1.0) # calculating the
    result = cv2.warpAffine(image, rot_mat, image.shape[1::-1],
flags=cv2.INTER LINEAR) # Getting the final image as a result
    return result
file = open("Output.txt", "w+") # Opening the output file to use it
img = cv2.imread('test sample2.jpg', 0) # Reading the input image
img = cv2.resize(img,(481,680)) # Resizing the image
img = cv2.bitwise not(img) # Inverting the image to be ready for applying some
operations
img edges = cv2.Canny(img, 100, 100, apertureSize=3) # Edge detection
lines = cv2.HoughLinesP(img_edges, 1, math.pi / 180.0, 100, minLineLength=50,
angles = []
for x1, y1, x2, y2 in lines[0]:
    angle = math.degrees(math.atan2(y2 - y1, x2 - x1)) # Calculating the angle of
    angles.append(angle)
median_angle = np.median(angles) # Getting the angle value to rotate the image
img = rotateImage(img,median angle) # Image rotation function by passing the image
and the angle calculated before
img = cv2.resize(img,(481,680)) # Resizing again after rotation
ret, thresh = cv2.threshold(img,235,255,cv2.THRESH_BINARY) # Applying thresholding on
kernel = cv2.getStructuringElement(cv2.MORPH ELLIPSE,(3,3))
eroded = cv2.erode(thresh,kernel)
eroded = cv2.dilate(eroded,kernel) # erosion to make sure there is no noise
answers = cv2.connectedComponentsWithStats(eroded, 4, cv2.CV_32S) # Function to
detect the components in the image after thresholding
answers = answers[2]
answers = answers[1:23]
Question no =
```

```
for i in answers: # printing the answers detected from the image
   if i[1] == answers[0][1]:
       if (i[0] >= 353) & (i[0] <= 391):
          file.write("Gender: Male \r\n")
      elif (i[0] >= 392) & (i[0] <= 446):
          file.write("Gender: Female \r\n")
   if i[1] == answers[1][1]:
      if (i[0] >= 145) & (i[0] <= 185):
           file.write("Semester: Fall \r\n")
      if (i[0] >= 190) & (i[0] <= 260):
          file.write("Semester: Spring \r\n")
       if (i[0] >= 290) & (i[0] <= 350):
          file.write("Semester: Summer \r\n")
   if i[1] == answers[2][1]:
      # Program value
      if (i[0] >= 120) & (i[0] <= 150) & ~(i[1] >= 140):
          file.write("Program: MCTA
      if (i[0] >= 159) & (i[0] <= 189) & ~(i[1] >= 140):
          file.write("Program: ENVER
if (i[0] >= 198) & (i[0] <= 228) & ~(i[1] >= 140):
          file.write("Program: BLDG
      if (i[0] >= 237) & (i[0] <= 277) & \sim (i[1] >= 140):
          file.write("Program: CESS
      if (i[0] \ge 275) & (i[0] < 305) & \sim (i[1] \ge 140):
          file.write("Program: ERGY
      if (i[0] >= 307) & (i[0] <= 337) & ~(i[1] >= 140):
          file.write("Program: COMM
      if (i[0] >= 354) & (i[0] <= 384) & ~(i[1] >= 140):
          file.write("Program: MANF
```

```
if (i[0] >= 120) & (i[0] <= 150) & (i[1] >= 140):
        file.write("Program: LAAR
    if (i[0] >= 159) & (i[0] <= 189) & (i[1] >= 140):
        file.write("Program: MATL
    if (i[0] >= 198) & (i[0] <= 228) & (i[1] >= 140):
        file.write("Program: CISE
   if (i[0] >= 237) & (i[0] <= 277) & (i[1] >= 140):
        file.write("Program: HAUD
while (j != 19) & (i[1] >= answers[3][1]):
    if i[1] == answers[j+3][1]:
        if (i[0] >= 310) & (i[0] <= 340):
            file.write("Question"+Question_no[j] + " : Strongly Agree
           break
        if (i[0] >= 341) & (i[0] <= 371):
           file.write("Question"+Question_no[j] + " : Agree
           break
        if (i[0] >= 372) & (i[0] <= 402):
            file.write("Question"+Question_no[j] + " : Neutral
           break
        if (i[0] >= 403) & (i[0] <= 433):
            file.write("Question"+Question_no[j] + " : Disagree
        if (i[0] >= 434) & (i[0] <= 474):
            file.write("Question"+Question_no[j] + " : Strongly Disagree
```

break

file.close()
cv2.waitKey(0)
cv2.destroyAllWindows()

Steps to reach the output:

- 1. Input image from the user.
- 2. After reading the input image, first resizing the image to make sure that any image has the same size so as the algorithm will work on any image size
- 3. Then checking if the image is rotated and detect the angle of rotation and the direction of rotation by calculating the slope
- 4. After rotating the image, thresholding is applied to remove any un-wanted data and focus on the needed features only
- 5. Finally assigning ranges for each question on the X-AXIS and Y-AXIS to be able to know the answer

Github repository: https://github.com/AndrewSameh1998/ocr.git

Test Cases 1:

THE VIANS	AIN SHAMS I-Credit Hou (i.CHEP)	rs Engine	ering Pr	ograms se/Module Eva	luation			Unive East I	
Course Code		Course Name			Gender	1) Male	● Fema	ile
iemester		● Fall	(2) Spring	③ Summ	er			
Program	① MCTA ⑧ LAAR	② ENVER ⑨ MATL	③ BLDG ⑪ CISE	④ CESS ● ER	RGY 6 CO	мм (7) MANF		
Mark as shown:	● CORRECT			pen or a thin felt tip. ples shown on the le					*
comments are n eview this cour Please select on	ot identified, so ple se/module and to p e box for each ques entify any individua	ase take the ti lan for the fut tion that best	me to answ ure. reflects you	rse/module. The resurer all the questions a or opinion. in your comments.					
1.1 The teachin	g on this course/mo	dule is intellec	tually stimu	lating.	1	(2)	(3)		(5)
	explained well in the			iding.		(2)	3	4	(5)
	g methods used hel				1)	(2)	3	•	(5)
	ere good at explaini				①		3	4	(5)
	module was academ		ing.		•	2	3	4	(5)
2. Course/Mo	dule Support	on the latest transfer	de la constante de la constant						
2.1 I am aware	of the course/modul	e learning out	comes.		1	•	3	4	(5)
2.2 The assessm	nent requirements w	ere clear.			1	2	3	4	•
2.3 I feel well su	apported on this cou	ırse/module.			1	2	3	•	(5)
2.4 Feedback o	n summative work v	vas provided w	rithin the tir	ne specified	1	•	3	4	5
2.5 The worklo	ad for this course/m	odule is manag	geable.		1	2	3	•	(5)
2.6 The assessn	nents completed so	far stimulated	my learning	1.	1	•	3	4	6
3. Course/Mo	dule Organization	NAME OF TAXABLE PARTY.		Philipping and					
3.1 The course/	module was well org	ganized and ra	n smoothly.		1	•	3	4	5
3.2 The course/	module focused on	what was set o	ut in the stu	ident guide.	•	2	3	4	5
2 2 I have been	able to contact staf	f when I neede	d to.		1	2	3	•	5
3.3 I nave been	dule Resources	-		Decision of the last of the la				-	
4. Course/Mo				pporting my learning	j. (1)	2	0	(4)	(5)
4. Course/Mo			ncluding its	digital resources,	•	2	3	4	5
4. Course/Mo	resources for the co	urse/module, ii							(5)
4. Course/Mo 4.1 The course/ 4.2 The library meet my ne	resources for the co			nis course/module.	1	2	•	4	9
4. Course/Mo 4.1 The course/ 4.2 The library meet my ne 4.3 I am satisfie	resources for the cor eeds.			nis course/module.	1	2		(4)	
4. Course/Mo 4.1 The course/ 4.2 The library meet my ne 4.3 I am satisfic 5. Course/Mo	resources for the con eds. ed with the quality o	f classroom fa	cilities for th	KA SA	•	2	3	4	5

Output for testcase 1:

Output.txt - Notepad				_	×
File Edit Format View Help Gender: Female					^
Semester: Fall					
Program: ERGY					
			====		
Question1.1 : Disagree					
		=====	====		
Question1.2 : Strongly Agree					
Question1.3 : Disagree					
	:========	=====	====		
Question1.4 : Agree					
Question1.5 : Strongly Agree					
	:========	=====	====		
Question2.1 : Agree					
Question2.2 : Strongly Disagree					
	:========	=====	====		
Question2.3 : Disagree					
					~
<	1-4 C-14	1000/	Manietanh (CD)	LITE	>
	Ln 1, Col 1	100%	Macintosh (CR)	UTF-8	

Figure 2 Test Case 1 Output File

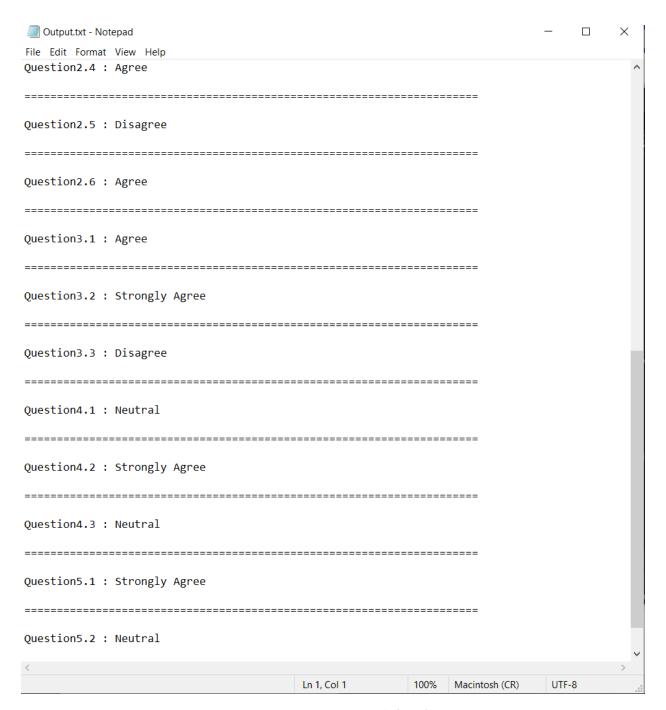


Figure 3 Test Case 1 Output File (Cont.)

Test Case 2:

		Fnd c	Programs			A COLUMN	376	Universi
Course		End-Cou	rse/Modu	ile Eval	uation		N.	East Lon
-	Course						***	
Semester					Gender	① Ma	ala a	
	Fall	(2 Spring				110	Female
Program	① MCTA ② ENVE				3 Summer			
-	8 LAAR 9 MATL	BLDG O CISE	4 CESS	⑤ ERGY	6 COMM			
Mark as shown:	CORRECT Please		① HAUD				ANF	
		a ball-point pe w the example	en or a thin fe	elt tin This				
It is important to	s to get feedback from you abo dentified, so please take the ti nodule and to plan for the futt ox for each question that best r	a ball-point pe w the example out this course	es shown on	the left har	form will be	processed	automat	ically
comments are not i	s to get feedback from you ab; dentified, so please take the ti nodule and to plan for the futu xx for each question that best r fy any individuals (including st.	out this cours			- side to ne	lp optimiz	e the rea	ding result
Plane Plane	nodule and to please take the ti	me to answer	module. The	results of	the curve			
- Plane select one bo	ox for each guan for the futu	ire.	all the questi	ons as fully	/ as you	re anonym	ised and	Indicate
Please do not identif	fy any individuestion that best r	eflects		· any	as you can.	Your feed!	Dack will	mulvidual
	nodule and to plan for the fut ox for each question that best r fy any individuals (including st	off	pinion.				OUCK WIII	be used to
		all names) in y	our commen	te				
1. Teaching Sessio	n.c.			1.5.				
0 - 55510	115			Stro	ongly			
1.1 The teaching on t	his com	Maria Caracana			ree Agree	Neutral	Di.	Chan
1.2 Matters are	ms course/module is intellectua	ally sti				- audi	Disagree	Strongly Disagree
1.3 Tho to	his course/module is intellectua ned well in the teaching session	any sumulating	g.					-isugiee
The teaching moth	session	is.		1	2	3		
1.4 Lecturers were goo	ods used helped me to learn. od at explaining things.			1	(2)			5
1.5 The course/modul	od at explaining things. was academically challenging.			(1)			4	5
- unite	was academically challen				(2)	3	•	
2. Course/Modules	thanenging.			1	•	3		5
2. Course/Module Su	Pport			1	(2)		4	5
2.1 I am aware of the co.	The second secon						4	(5)
2.2 The asses	urse/module learning outcome	The second second	100					
2.2 The assessment requi	irements were class	5.						
2.3 I feel well supported	on this an				2	3	_	
2.3 I feel well supported 2.4 Feedback on summat	on this course/module. ive work was provided within t course/module is manageable			1	(2)		4	(5)
2.5 The workload for the	work was provided with:	h		(1)			4	
2.6 The assessment	course/module is managed to	ne time specifi	ied	•	2	3	•	
ments comp	oleted so far stimular				2	0	_	6
3. Course/Module Organ	course/module is manageable. Dieted so far stimulated my lear	ning.		1	2	(3)		5
and Olda	nization .			1				5
3.1 The course/module was	well organized and ran smootl	Section				3)	(5
3.2 The course/module c	well organized and ran smooth	bl						_
3.3 I have be	sed on what was set out in	niy.		1				
3.3 I have been able to cont	well organized and ran smootl ised on what was set out in the act staff when I needed to	student guide			• (3	(4)		
4. Course/la	men I needed to.				2 (3		- 0	
4. Course/Module Resour	ces			1	(2)		5	
1.1 The course/modul	The second secon					4	(5)	
.2 The library research	rials on Moodle are helpful	THE PERSON NAMED IN						
meet meet meet meet meet meet meet meet	he course/module in the	upporting my l	learning	0				
21.	rials on Moodle are helpful in si he course/module, including it:	s digital resour	Ces		2	4		
I am satisfied with the qua	lity of class	-	-20,	1	(3)	4	(5)	
Course (ne	lity of classroom facilities for th	nis course/				•	5	
. Course/Module Satisfacti	on	- se/mod	lule.	1	2			
Overall, I was saving	The state of the s					4	(5)	
I would recommend with	my experience of this course	and t						
	Irse/modul	nodule.						
recommend this cou	module to anoth			(2)				
recommend this cou	another student	t			3	(4)	0	
I would recommend this cou	secondatile to another student	t			3	4	(5)	

Test Case 2 Output :

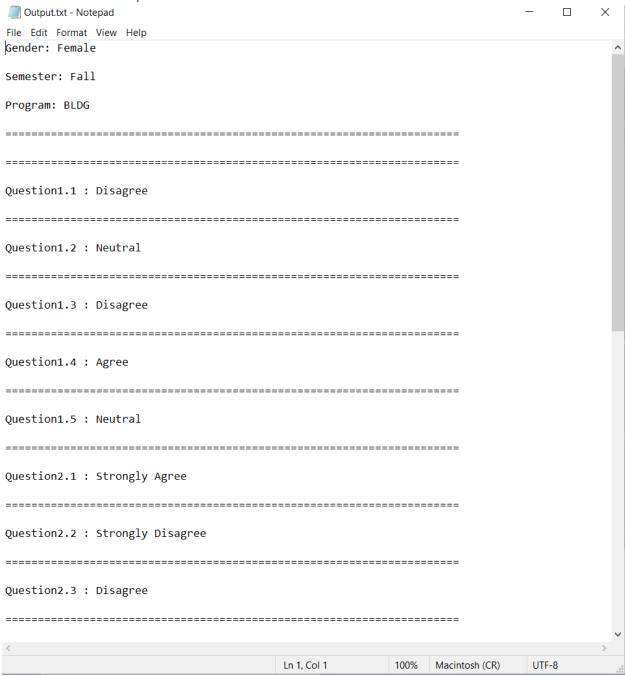


Figure 5 Test Case 2 Output File

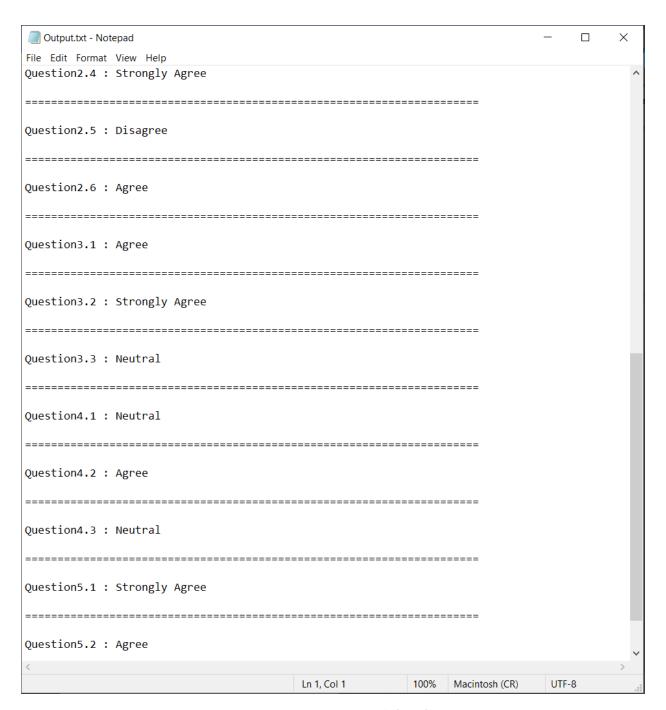


Figure 6 Test Case 2 Output File (Cont.)

Test Case 3:

III ALIA	IN SHAMS UI -Credit Hours i.CHEP)	Engine	ry ering Pro d-Course	grams e/Module	Evalua	tion		E	niversit ast Lon	don
Г		Course				Gender	● Ma	ale 2	Female	
Course Code		Name				~				
	(1	Fall		Spring	(3 Summer				
Semester		O	③ BLDG	4 CESS	5 ERGY	● coM	M 7	MANF		
Program	① MCTA (8) LAAR	2 ENVER 9 MATL	(CISE	(11) HAUD						
1109			a ball-point	nen or a thir	felt tip. Thi	s form will	be proces	ssed auto	omatically o reading	results.
Mark as shown:	○ CORRECT	Please use	a ball-point ow the exam	ples shown	on the left h	and side to	help op	timize tri	e reading	
the coll	o us to get feedback not identified, so ple se/module and to p te box for each que dentify any individu		77	SULT ONINION.		Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
1. Teaching	Sessions	-	and the second	and the latest of the latest o			2	(3)	4	5
I	ng on this course/m	odule is into	ellectually sti	mulating.		-	2	3	4	6
	o explained well in	the teaching	363310110			1	•	3	4	5
1 3 The teach	ing methods used n	elben me to				•	2	3	4	5
The second secon	and at expla	ining things	•			1	•	3	4	0
1.5 The cours	se/module was acad	emically cha	illenging.		3					
2 Course/	Module Support	-	A STATE OF THE PARTY OF	CHARLES STREET	20	1	2	3	•	5
2.1 Lam awa	re of the course/mo	dule learnin	g outcomes.			1	2	•	4	5
- a Th - acco	coment requirement	ts were clear	•			1	2	3		
2.2 The days	Il supported on this	course/mod	lule.	ho time spec	fied	1	2	0	4	
				ne time spee		1	•	3		
2.5 The wo	kload for this cours	e/module is	manageable	rning.		1	•	(3)		
2.6 The ass	kload for this cours essments complete	d so far stilli	ulated my							
2 Course	/Module Organiza	tion	and the state of the	photostables	geni	1	(2			5
		IInizec	and ran smo	othly.		(1				4) (5
3.1 The co	urse/module was wo urse/module focuse	d on what w	as set out in	the student	guide.	(1				4)
3.2 The co	urse/module focuse been able to contac	t staff when	I needed to.			0			77-7-1-1	
	been able to contac									
3.3 I have	se/Module Resource	es	Access (Special Sec.	ALTERNATION OF THE PARTY NAMED IN	- Loar	ning.	1)		-	4
3.3 I have	6/Monaic		dle are helpf	ul in support	Ing my lear			2	•	4
3.3 I have		riais on moo	andula inclu	ding its digit	ai resources				0	(4)
3.3 I have		the course/r	nouule, men				1	•	3	4
3.3 I have 4. Cours 4.1 The co	ourse/module mate brary resources for	the course/i	noutre,		urse/modul	e.				
3.3 I have 4. Cours 4.1 The co	ourse/module mate brary resources for	the course/i	noutre,	ies for this co	urse/modul	e.				
4. Cours 4.1 The co 4.2 The li meet 4.3 I am	ourse/module mate brary resources for my needs. satisfied with the q	uality of clas	noutre,	ies for this co	urse/modul	e.				(4)
4. Cours 4.1 The Cours 4.2 The limeter 4.3 I am	ourse/module mate brary resources for	uality of clas	sroom facilit	ies for this co	urse/modul	e.	1	2	• 3	(4)

Test Case 3 Output:

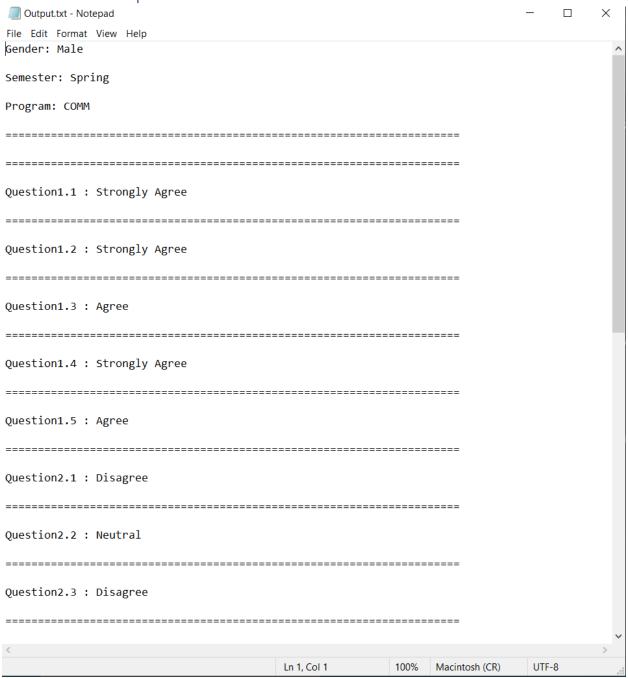


Figure 8 Test Case 3 Output File

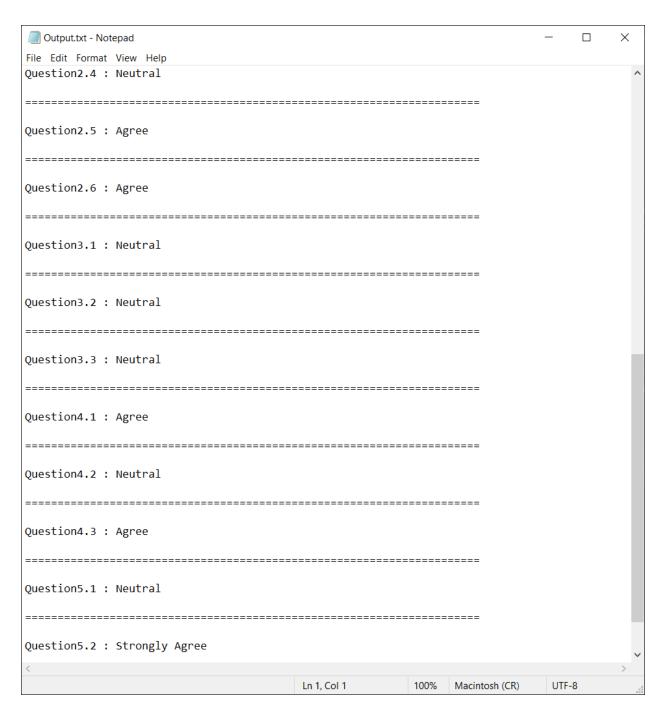


Figure 9 Test Case 3 Output File (Cont.)