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 Penulis : Arief Setyanto, Bayu Setiaju, Mardhiya Hayaty, Krisnawati  
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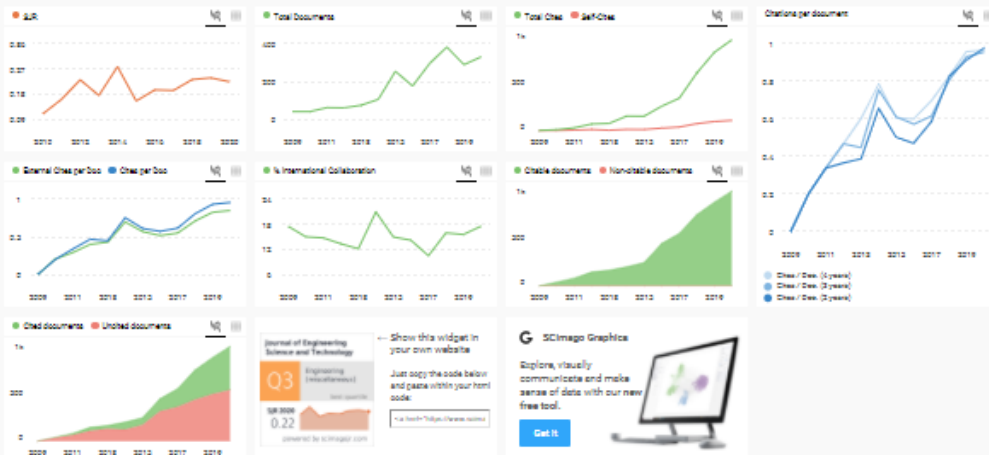
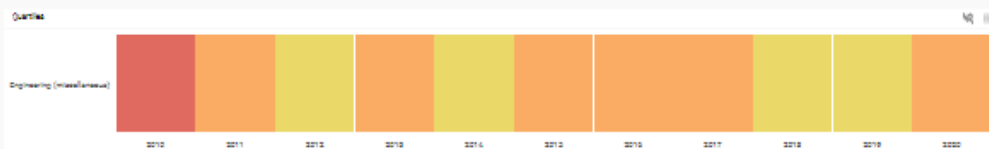
## Journal of Engineering Science and Technology

<b>COUNTRY</b> Malaysia <small>Universities and research institutions in Malaysia</small>	<b>SUBJECT AREA AND CATEGORY</b> Engineering Engineering (miscellaneous)	<b>PUBLISHER</b> Taylor's University <small>Taylor's University is a Strategic Institution in Malaysia</small>	<b>H-INDEX</b> <b>27</b>
<b>PUBLICATION TYPE</b> Journals	<b>ISSN</b> 1820-6690	<b>COVERAGE</b> 2004-2020	<b>INFORMATION</b> <a href="#">Homepage</a> <a href="#">How to publish in this journal</a> <a href="mailto:g.deiva@tunis145u.edu.au">g.deiva@tunis145u.edu.au</a>

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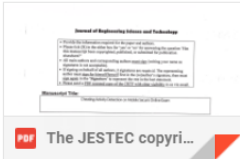

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Regards

Arief Setyanto

⋮

**5 Attachments**


-  Mobile Online Exa...
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**Arief Setyanto** <arief\_s@amikom.ac.id>  
to Mordhine

## 2. Paper lengkap dan dimulai proses Review round 1

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Submission of a Manuscript (EE19229) / First Round of the Review Process Inbox × 🖨️ 📧

 **Jestec** <Jestec@taylors.edu.my> Wed, Dec 18, 2019, 3:39 PM ☆ ↶ ⋮  
to me ▾

Dear Author

Thank you for submitting your research paper to the Journal of Engineering Science and Technology (JESTEC)

Kindly note that we have received the paper entitled

***CHEATING ACTIVITY DETECTION ON MOBILE SECURE ONLINE EXAM***

Your paper ID is **EE19229** (Please quote the above manuscript ID in all future correspondence with us.)

Soon we will initiate the first round of the review process.

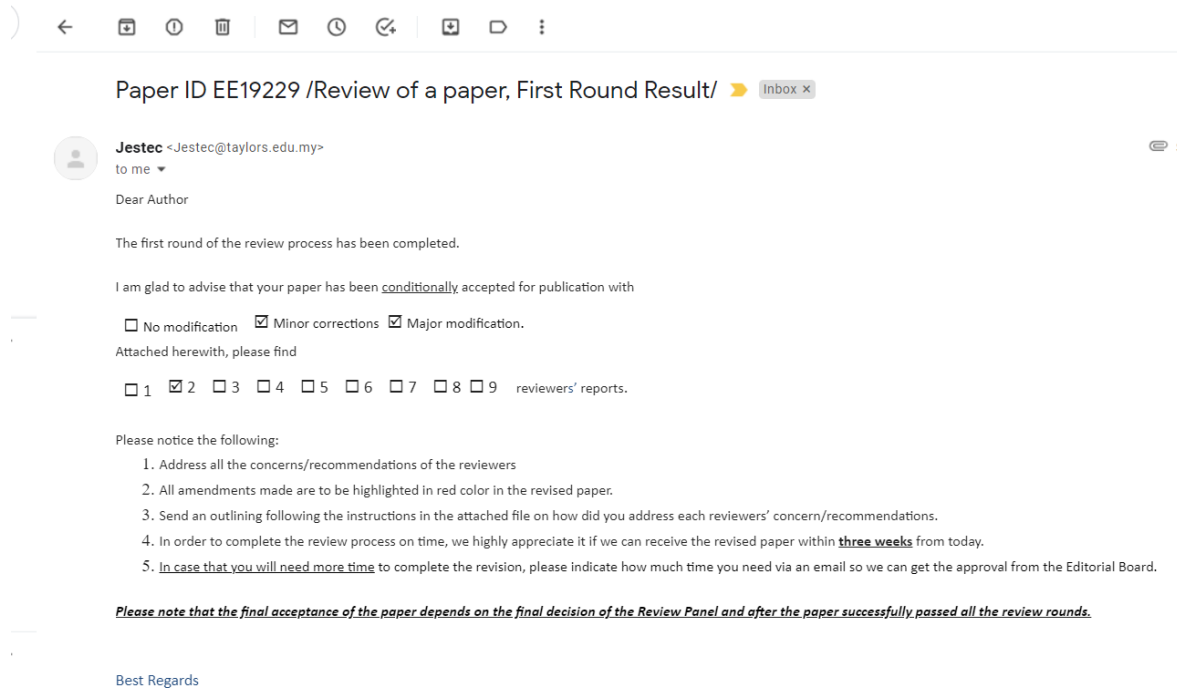
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Best regards

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3. Paper selesai di review pada putaran pertama dinyatakan diterima dengan revisi minor dan revisi mayor – oleh para reviewer pada 9 Februari 2020, komentar reviewer terlampir



## Journal of Engineering Science and Technology (JESTEC)

### REVIEW FORM

**Title of paper:**

Cheating Activity Detection on Mobile Secure Online Exam

For sections A & B, please tick a number from 0 to 5, where 0 = strongly disagree and 5 = strongly agree.

#### A. Technical aspects

- |  |                            |                            |                            |                                       |                            |                            |
|--|----------------------------|----------------------------|----------------------------|---------------------------------------|----------------------------|----------------------------|
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| 2. The paper is original.                        | <input type="checkbox"/> 0 | <input type="checkbox"/> 1 | <input type="checkbox"/> 2 | <input checked="" type="checkbox"/> 3 | <input type="checkbox"/> 4 | <input type="checkbox"/> 5 |
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#### B. Communications aspects

- |  |                            |                            |                            |                                       |                            |                            |
|--|----------------------------|----------------------------|----------------------------|---------------------------------------|----------------------------|----------------------------|
| 1. The paper is clearly readable.                                  | <input type="checkbox"/> 0 | <input type="checkbox"/> 1 | <input type="checkbox"/> 2 | <input checked="" type="checkbox"/> 3 | <input type="checkbox"/> 4 | <input type="checkbox"/> 5 |
| 2. The figures are clear & do clearly convey the intended message. | <input type="checkbox"/> 0 | <input type="checkbox"/> 1 | <input type="checkbox"/> 2 | <input checked="" type="checkbox"/> 3 | <input type="checkbox"/> 4 | <input type="checkbox"/> 5 |
| 3. The length of the paper is appropriate.                         | <input type="checkbox"/> 0 | <input type="checkbox"/> 1 | <input type="checkbox"/> 2 | <input checked="" type="checkbox"/> 3 | <input type="checkbox"/> 4 | <input type="checkbox"/> 5 |

**C. Comments to the authors** (You may use another sheet of paper.)

There are much Error spelling in this paper, such as Section 2., Section 3. ... equation (1), (2), (3) ...

The author should write more succinctly.

Any requirements to obtain test results are presented in this paper

This paper presents an audio-video analysis for cheating action recognition to support a mobile exam proctoring, only using standard smartphone accessories.

The author did not give the algorithms of the Multimodal Action Detection – It is main core-content of the paper.

**D. Recommendation** (Tick one)

- 1. Accepted without modifications.
- 2. Accepted with minor corrections.
- 3. Accepted with major modification.
- 4. Rejected.

**E. Comments to the editors** (These comments will not be sent to the authors)

**REVIEW FORM**

**Title of paper:** Cheating Activity Detection on Mobile Secure Online Exam

For sections A & B, please tick a number from 0 to 5, where 0 = strongly disagree and 5 = strongly agree.

**A. Technical aspects**

- |  |                            |                            |                            |                                       |                                       |                            |
|--|----------------------------|----------------------------|----------------------------|---------------------------------------|---------------------------------------|----------------------------|
| 1. The paper is within the scope of the Journal. | <input type="checkbox"/> 0 | <input type="checkbox"/> 1 | <input type="checkbox"/> 2 | <input type="checkbox"/> 3            | <input checked="" type="checkbox"/> 4 | <input type="checkbox"/> 5 |
| 2. The paper is original.                        | <input type="checkbox"/> 0 | <input type="checkbox"/> 1 | <input type="checkbox"/> 2 | <input type="checkbox"/> 3            | <input checked="" type="checkbox"/> 4 | <input type="checkbox"/> 5 |
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**B. Communications aspects**

- |  |                            |                            |                            |                                       |                                       |                            |
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| 1. The paper is clearly readable.                                  | <input type="checkbox"/> 0 | <input type="checkbox"/> 1 | <input type="checkbox"/> 2 | <input checked="" type="checkbox"/> 3 | <input type="checkbox"/> 4            | <input type="checkbox"/> 5 |
| 2. The figures are clear & do clearly convey the intended message. | <input type="checkbox"/> 0 | <input type="checkbox"/> 1 | <input type="checkbox"/> 2 | <input checked="" type="checkbox"/> 3 | <input type="checkbox"/> 4            | <input type="checkbox"/> 5 |
| 3. The length of the paper is appropriate.                         | <input type="checkbox"/> 0 | <input type="checkbox"/> 1 | <input type="checkbox"/> 2 | <input type="checkbox"/> 3            | <input checked="" type="checkbox"/> 4 | <input type="checkbox"/> 5 |

**C. Comments to the authors (You may use another sheet of paper.)**

1. There are several grammatical mistakes that must be fixed.
2. Every variable or value must be equipped with unit.
3. Problem statement must be declared clearly before research purpose.
4. Research framework as it is shown in Figure 1 should be explained.
5. Imperative sentences should be avoided.
6. System limitations should be declared.
7. Graphics or charts should be equipped with unit.
8. Testing scenario and environment should be described clearly.
9. System diagram should be added so that in which parts the work implemented is clear.
10. Reasoning in perceptron design should be added. Why there are 20 hidden layers and 1290 nodes in input layer.

**D. Recommendation (Tick one)**

- |                                    |                          |
|------------------------------------|--------------------------|
| 1. Accepted without modifications. | <input type="checkbox"/> |
|------------------------------------|--------------------------|




- 2. Accepted with minor corrections. ✓
- 3. Accepted with major modification.
- 4. Rejected.

**E. Comments to the editors** (These comments will not be sent to the authors)

## 4 saya meminta perpanjangan masa koreksi 2 minggu karena belum selesai (28 Februari) di approve pada 29 Februari perpanjangan masa koreksi

← 📎 🕒 🗑️ 📧 🕒 ↻ 📎 🗑️ ⋮ 15 of 26 < >

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 **Arief Setyanto** <arief\_s@amikom.ac.id> Feb 28, 2020, 3:40 PM ☆ ↶ ⋮  
to Jestec ▾


Dear executive editor,  
Thank you very much for the feedback for the paper that I submitted.  
Currently, I am still revising the paper. I still working with some issues to address the reviewer's comments. I would like to ask for an extension for two weeks but if I can make it earlier I will submit it as early as possible.

Regards

Arief Setyanto

⋮

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 **Jestec** <Jestec@taylors.edu.my> Feb 29, 2020, 7:04 AM ☆ ↶ ⋮  
to me ▾

accepted

Best Regards

JESTEC Editor  
<http://jestec.taylors.edu.my>

⋮

←

5. Tanggal 11 Maret saya mengirim hasil koreksi paper, Tanggal 29 Maret di balas dokumen yang dikirimkan masih terdapat personalisasi sehingga perlu dikirim ulang dengan menghilangkan identitas penulis karena prosesnya merupakan double blind review

**Arief Setyanto** <arief\_s@amkrum.ac.id>  
to Jestec

Dear Chief Editor  
I would like to submit the correction of my paper to address to reviewer's comments.

Regards

Arief Setyanto

...

**2 Attachments**



**Jestec** <Jestec@taylors.edu.my>  
to me

Mar 29, 2020, 11:17 AM

Dear Author  
Thank you for your email and submitting your revised paper.  
However, there is an issue you must fix before we start the 2<sup>nd</sup> round of the review process.  
When you do the revision of your paper, please remove anything which reveals your identity. This is because our review process is double-blind peer review.  
Kindly, check and resend the documents.  
Best Regards

## 6. 31 Maret saya mengirimkan kembali koreksi paper dan jawaban komentar reviewer terlampir

15 c



Review Report\_FM...

Manuscript\_Correc...



**Arief Setyanto** <arief\_s@amikom.ac.id>

Mar 31, 2020, 3:39 PM

to Jestec

Dear Chief Editor

I would like to apologize on the issue of personal data in the previous file. We have already fix it. I attach both files.

Thank you very much

Regards

Arief Setyanto

\*\*\*

### 2 Attachments



**Arief Setyanto** <arief\_s@amikom.ac.id>

Jul 15, 2020, 11:18 AM

**OUTLINING HOW THE ISSUES ARE ADDRESSED**

**Title of paper:**

**CHEATING ACTIVITY DETECTION ON SECURE ONLINE MOBILE EXAM**

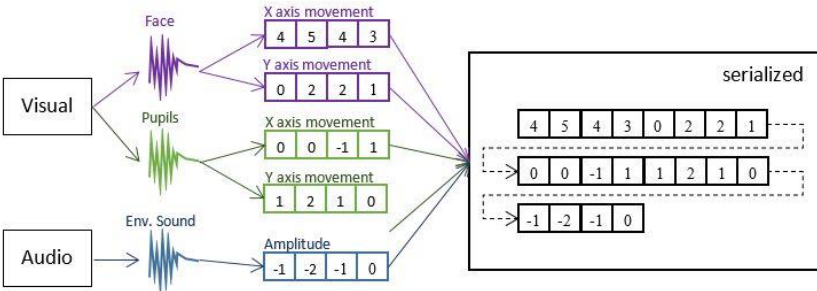
1. Address all the concerns/recommendations of the reviewers.
2. All amendments made are to be highlighted in red color in the revised paper.

**Reviewer # 1**

Final Recommendation	Accepted without modification	Accepted with minor corrections	Accepted with major modification	Rejected
Please tick	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Comments	Addressed (Y/N)	Reply/Action taken
There are much Error spelling in this paper, such as Section 2., Section 3. ... equation (1), (2), (3) ...	Y	<p>Thank you for the comments, we address with correction throughout the paper to address the spelling error in the text and the equation.</p> <p>The vector was then normalized to acquire L2-Norm, L1-Norm and L1-Sqrt in equations (1), (2), and (3).</p> $L2 - Norm : f = \frac{v}{\sqrt{\ v\ _2^2 + e^2}} \quad (1)$ $L1 - Norm : f = \frac{v}{\ v\ _1 + e} \quad (2)$ $L1 - Sqrt : f = \sqrt{\frac{v}{(\ v\ _1 + e)}} \quad (3)$
The author should write more succinctly.	Y	Already corrected by professional Proof Reader

<p>Any requirements to obtain test results are presented in this paper</p>	<p>Y</p>	<p>Thank you for the comments, we add specific requirement during the experiments and also the specification of smartphone used in our research.</p> <p><b>Page 10 , Last Paragraph :</b></p> <p>This experimental research was carried out in a quiet testing environment away from the crowd to benefit the exam room. The research location was a 3x3 meter room which had bright lighting, tables, and chairs. Each participants sitting and working on exam questions all had a smart phone. Their profiles were quite diverse, with male and female, wearing/not wearing glasses, or veil. The data collection was carried out simultaneously among four participants in meeting rooms.</p> <p><b>Page 11 :</b></p> <p style="text-align: center;"><b>Table 1. SmartPhone Specification</b></p> <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="text-align: center;">Specs</th> <th style="text-align: center;">Samsung A2 Core</th> <th style="text-align: center;">Samsung A20</th> <th style="text-align: center;">Vivio Y15</th> </tr> </thead> <tbody> <tr> <td><b>CPU</b></td> <td>1.6 GHz Octacore</td> <td>2x 1.6 GHz Octacore</td> <td>2.0 GHz Octacore</td> </tr> <tr> <td><b>RAM</b></td> <td>1 GB</td> <td>3 GB</td> <td>4 GB</td> </tr> <tr> <td><b>Display</b></td> <td>5" 540 x 960 px</td> <td>6.4" 720 x 1560 px</td> <td>6.35" 720 x 1544 px</td> </tr> <tr> <td><b>Front Cam</b></td> <td>5 MP</td> <td>8 MP</td> <td>16 MP</td> </tr> <tr> <td><b>Back Cam</b></td> <td>5 MP</td> <td>13 Mp</td> <td>13 MP</td> </tr> <tr> <td><b>OS</b></td> <td>Android 8.0</td> <td>Android 9.0</td> <td>Android 9.0</td> </tr> </tbody> </table>	Specs	Samsung A2 Core	Samsung A20	Vivio Y15	<b>CPU</b>	1.6 GHz Octacore	2x 1.6 GHz Octacore	2.0 GHz Octacore	<b>RAM</b>	1 GB	3 GB	4 GB	<b>Display</b>	5" 540 x 960 px	6.4" 720 x 1560 px	6.35" 720 x 1544 px	<b>Front Cam</b>	5 MP	8 MP	16 MP	<b>Back Cam</b>	5 MP	13 Mp	13 MP	<b>OS</b>	Android 8.0	Android 9.0	Android 9.0
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<p>This paper presents an audio-video analysis for cheating action recognition to support a mobile exam proctoring, only using standard smartphone accessories.</p>	<p>N</p>																													
<p>The author did not give the</p>	<p>Y</p>	<p>Thank you for this comment, we address the comments by providing additional explanation of our multimodal data and the figure to draw our approach in.</p>																												

<p>algorithms of the Multimodal Action Detection – It is main core-content of the paper.</p>		<p><b>Page 5-6</b></p> <p>The video data was extracted into two time series features namely face and pupil movements. Two modalities were obtained in the data collection tasks. The video was explored into the movement using motion vector calculation and <i>lucas-kanade</i> methods. Before the tracking started, the face and eye recognition was carried out. This produced a three time series data which are face tracking, eye tracking and audio data. In order to enable the modality fusion for all the data, normalization was carried out in a range of -10 to 10. The periodicity of the data sampled was in 12 data point per second. During the data collection, the original duration were not precisely uniform, while pre-processing and was standardized into 21.5 seconds for each captured audio video. The face tracking produced two variables <i>x</i> and <i>y</i>, which was considered as 1 unit for every 25 pixel movement. Furthermore, the pupil tracking yielded two <i>x</i> and <i>y</i> variables in pixel. Sound on the other hand produced one variable and was sampled in exactly the same frequency at 12 data per second. During the feature extraction, a zero padding is implemented to ensure standard length of each feature for each audio video data. Figure 3 shows the multimodal data pre-processing before a multi-layer perceptron was applied.</p>  <p><b>Fig 1. Multi Modal Feature Extraction and Fusion</b></p>
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(Please add more rows if needed)

<b>Reviewer # 2</b>				
<b>Final Recommendation</b>	<b>Accepted without modification</b>	<b>Accepted with minor corrections</b>	<b>Accepted with major modification</b>	<b>Rejected</b>

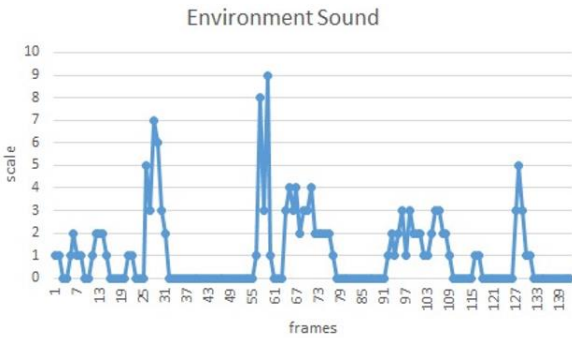
Please tick



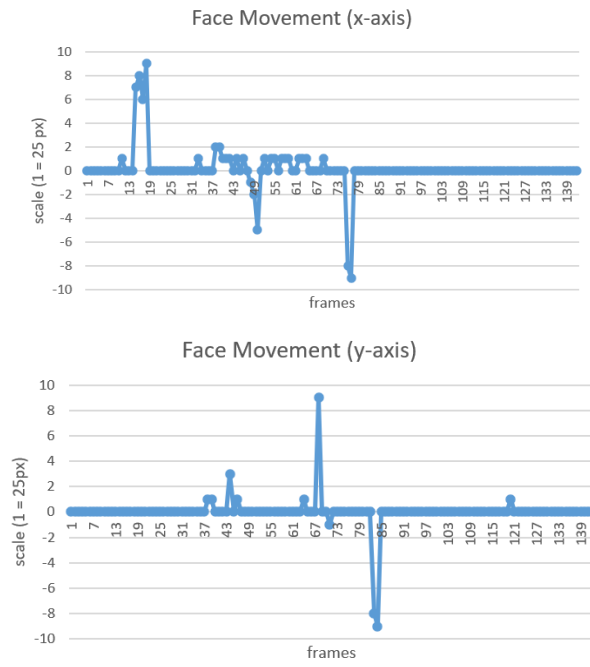


Comments	Addressed (Y/N)	Reply/Action taken
There are several grammatical mistakes that must be fixed.	Y	Thank you for your comments, The grammatical error Already corrected by professional Proof Reader
Every variable or value must be equipped with unit.	Y	<p><b>Page 8 - 3.2.2 Face Tracking, Paragraph 2 :</b> The value was set between -10 ... 10, were recorded as 25 pixel for 1 unit.</p> <p><b>Page 8 – 3.2.3 Eye-tracking , Paragraph 2 :</b> in number of pixel displacement</p>
Problem statement must be declared clearly before research purpose.	Y	<p>Thankyou for your comments, we underline the aims of the research in the <b>Pages 2, Paragraph 5 :</b></p> <p>.....Moreover, in some research such as in [10], [11], special devices such as additional camera, electroencephalogram(EEG) and gaze tracker need to be installed. This research aims to simplify the online exam proctoring task with standard devices only for easier implementation. This research investigates minimum set of data acquired by the standard camera and audio recorder of low-end smartphone to recognize pre-defined cheating activities using artificial neural network (ANN).</p>
Research framework as it is shown in Figure 1 should be explained.	Y	<p>Thank you for the comments, we add the explanation of the research framework in <b>Page 4 (paragraph 3) and Page 5 (paragraph 1):</b></p> <p>Online exam cheating activities is defined into seven types. They consist of opening/reading a book, sending/receiving messages through a smart phone, accepting help from people, receiving clues through paper, using the computer to browse testing material, and asking for answers from someone. In order to build a dataset, these activities were recorded in audio and video through standard smart phones. An additional video of non-cheating participants was also recorded with a standardized recording duration of 21.5 seconds in 12 frame per second (fps). A feature extraction was carried out of all the positive and negative cheating videos. The visual and motion data were extracted into face and pupil movement, while the audio was sampled into 12 data per</p>

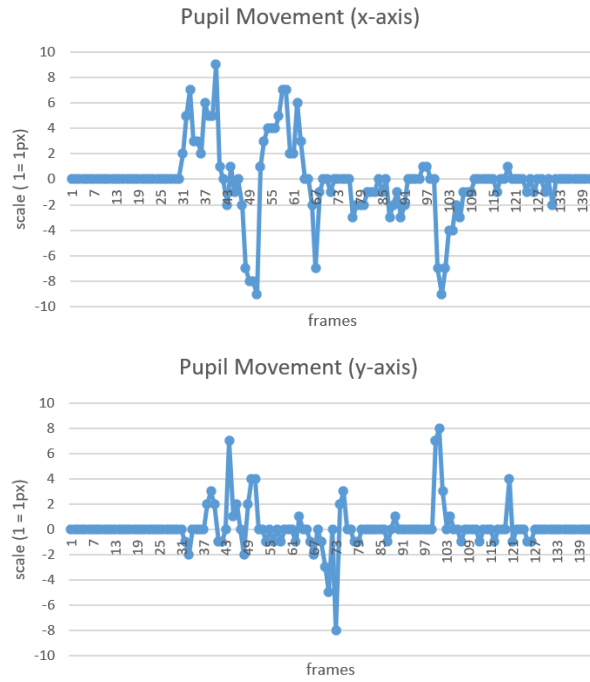


		second. The three modalities were fused before entering the network in artificial neural network (ANN), thereby, leading to a total of 1290 data length for each recorded activity. Multi perceptron (MLP), training and evaluation were carried out by using the available data.
Imperative sentences should be avoided.	Y	Already corrected by professional Proof Reader
System limitations should be declared.	Y	<p>Thank you for your comments, we address the comment by a new paragraph in <b>page 15, last paragraph</b> :</p> <p>This research is limited by the pre-defined cheating action under specified requirements in the experimental setting. However, despite the unavailability of empirical data, and the specified resolution of the video, the result might be degraded. Secondly, other types of cheating are likely to be beyond the simulated activity pre-set in this research, with undefined outcomes. The lighting in this study was set in stable and visible condition, therefore, a darker situation is likely to lead to a significant decrease on recognition quality. The noisy sound is also a challenge as the dataset was taken in a controlled condition where the noise is at a minimum level. Another potential problem of this research is privacy issue, due to the need of recording the video and audio during the exam. In the future, a signal transformation on the recording device would be an alternative to overcome the privacy issue. Due to the limited possibility of cheating/non-cheating actions detected, the exact activity was not precisely recognized such as reading a book, using mobile phone etc. These limitations are a guide for future research.</p>
Graphics or charts should be equipped with unit.	Y	<p>We add the unit in each graphics. Especially for sound we do not have the units, the number 0 – 10 is a normalized value relative to maximum amplitude.</p> <p><b>Page 12 – 13</b></p> 

**Fig 2. Sound Signal Feature**



**Fig 3. Face tracking movement**



**Fig 4. Eye Tracking Signal**

<p>Testing scenario and environment should be described clearly.</p>	<p>Y</p>	<p>Thankyou for your comments, We address by an additional explanation in</p> <p><b>Page 10, 3.4. Experimental Design</b></p> <p>This experimental research was carried out in a quiet testing environment away from the crowd to benefit the exam room. The research location was a 3x3 meter room which had bright lighting, tables, and chairs. Each participants sitting and working on exam questions all had a smart phone. Their profiles were quite diverse, with male and female, wearing/not wearing glasses, or veil. The data collection was carried out simultaneously among four participants in meeting rooms.</p> <p>.....</p> <p>.....</p> <p>Three low end smart phones with the specification below were used.</p> <p style="text-align: center;"><b>Table 2. SmartPhone Spesification</b></p> <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="text-align: left;">Specs</th> <th style="text-align: left;">Samsung A2 Core</th> <th style="text-align: left;">Samsung A20</th> <th style="text-align: left;">Vivio Y15</th> </tr> </thead> <tbody> <tr> <td><b>CPU</b></td> <td>1.6 GHz Octacore</td> <td>2x1.6 GHz Octacore</td> <td>2.0 GHz Octacore</td> </tr> <tr> <td><b>RAM</b></td> <td>1 GB</td> <td>3 GB</td> <td>4 GB</td> </tr> <tr> <td><b>Display</b></td> <td>5" 540 x 960 px</td> <td>6.4" 720 x 1560 px</td> <td>6.35"720 x 1544 px</td> </tr> <tr> <td><b>Front Cam</b></td> <td>5 MP</td> <td>8 MP</td> <td>16 MP</td> </tr> <tr> <td><b>Back Cam</b></td> <td>5 MP</td> <td>13 Mp</td> <td>13 MP</td> </tr> <tr> <td><b>OS</b></td> <td>Android 8.0</td> <td>Android 9.0</td> <td>Android 9.0</td> </tr> </tbody> </table>	Specs	Samsung A2 Core	Samsung A20	Vivio Y15	<b>CPU</b>	1.6 GHz Octacore	2x1.6 GHz Octacore	2.0 GHz Octacore	<b>RAM</b>	1 GB	3 GB	4 GB	<b>Display</b>	5" 540 x 960 px	6.4" 720 x 1560 px	6.35"720 x 1544 px	<b>Front Cam</b>	5 MP	8 MP	16 MP	<b>Back Cam</b>	5 MP	13 Mp	13 MP	<b>OS</b>	Android 8.0	Android 9.0	Android 9.0
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<p>System diagram should be added so that in which parts the work implemented is clear.</p>	<p>Y</p>	<p><b>Page 6, Paragraph 1 :</b></p> <p>Figure 3 shows the multimodal data pre-processing before a multi-layer perceptron was applied.</p> <p style="text-align: center;">Fig 5. Multi Modal Feature Extraction and Fusion</p>																												
<p>Reasoning in perceptron design should be</p>	<p>Y</p>	<p>Thankyou for you comments, provide an experimental result, a varied hidden layer applied and 20 layer produce the best result, therefore, we choose 20 hidden layers</p> <p><b>Page 10, Paragraph 2 :</b></p> <p>....the network were set with 10, 20, 30 and 40 hidden layers</p>																												

added. Why there are 20 hidden layers and 1290 nodes in input layer.

**Page 14, Paragraph 2 :**

.....Table 2 shows the average, accuracy, precision and f1score of the classification result using MLP with varied Hidden Layer. ....

**Table 3. Average Accuracy, Recall, Precision and F1 Score for different Hidden Layer**

<b>Hidden Layer</b>	<b>Accuracy</b>	<b>Recall</b>	<b>Precision</b>	<b>F1 Score</b>
<b>10</b>	0.910325	0.910325	0.911421	0.910325
<b>20</b>	0.917338	0.917338	0.929832	0.916798
<b>30</b>	0.903312	0.903312	0.909436	0.902822
<b>40</b>	0.903182	0.903182	0.912396	0.902383
<b>50</b>	0.913896	0.913896	0.91895	0.913387

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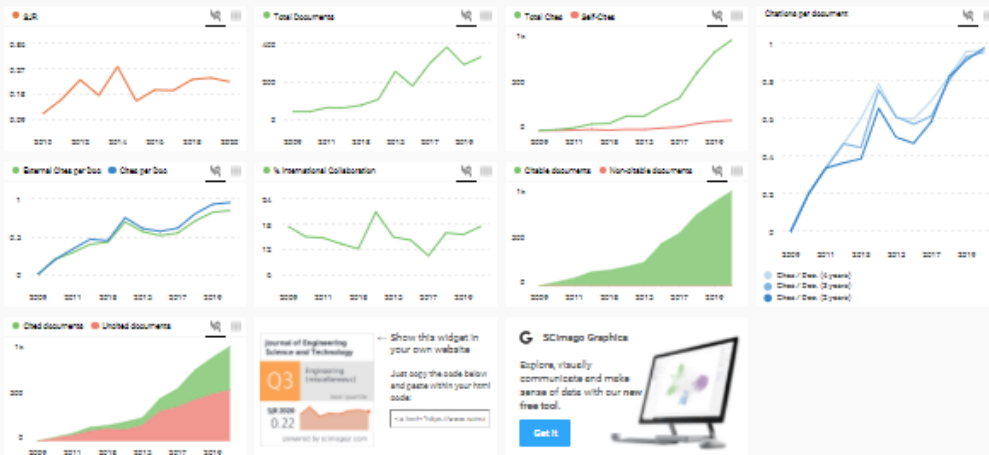
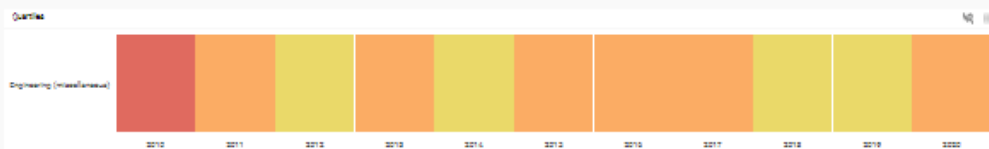
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