

Course Project

for DSP2 Applications 2021

Project Description

Writing a report on one of the given subjects in Arabic and prepare a PPT presentation on the same subject.

Objectives of the Project:

1. To train the students on how to make a review on a new subject related to Artificial Intelligence.
2. To avail the reports of the project to all students in their mother language to have faster understanding, and to widen their scope about the Artificial Intelligence and its applications.

Guidelines:

- ✓ 1. Each group will select one of the project subjects below. The maximum number of groups working on the same subject is 2 groups. In case two groups work on the same subject they MUST work independently.
2. Each group will search on the web for the most cited (at least 5 references (like: papers, books, book chapters or websites...etc.)), among these references at least 3 must be very recent after 2018. Be careful not to use any Arabic reference as is, you can benefit from them if there are some but not to copy and pest any of part of them. however, when reporting the references you may add any important and relevant references more than you have worked on as mentioned above.
3. Expected size of the report is 20-25 pages written in Traditional Arabic font and size 14, not including the head page(s) nor the appendices. you will add few appendices as follows:
 - a. First appendix will contain a glossary (مسرّد) of the keywords that have been used in the report with simple explanation as seen in this example:

Artificial Intelligence	الذكاء الاصطناعي
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في علوم الحاسوب؛ يُقصدُ به إخضاع الآلة لمحاكاة ذكاء الإنسان من خلال
بناء أنظمة وبرمجيات حاسوبية تفاعلية، قادرة على التعامل مع الإنسان وتلبية رغباته.

- b. Add any other content that you may need to add in additional appendices.
4. An Arabic presentation of about 20-25 slides is also needed. Use simple white plain template in your presentation. The more graphics and figures to explain the ideas the better. The presentation should be in Arabic while using English terms is accepted (e.g.:
يعتبر الذكاء الاصطناعي AI من المجالات المهمة..)
5. The marks will go like that:
 - a. The 3 assignments have 3 marks for each of them. there should be a 4th assignment whoever for the squeezed time of the course, I will not add a 4th assignment and I will consider the 12 marks to be distributed on the given 3 assignments, i.e., 4 marks for each assignment.
 - b. The project will have 18 marks. this mark (18) will be for projects that has two groups.
 - c. However, for subjects that has only one group the maximum will be 21 marks.
 - d. Excellent written projects will get additional reward. So, I recommend making sincere effort to produce a good project. This will benefit you and your colleagues.
6. The deadline for this project is 7th of June.
7. The delivered documents will include:
 - a. The report in Arabic with its appendices
 - b. The presentation in Arabic
 - c. The 3 assignments sent before + their codes either in Python or MATLAB in word format.
 - d. The head page must start with Group no. X. with the full names in Arabic.



Suggested process

- Select a subject of the available subjects and be sure that there is no more than two groups working on it (your group is one of them).
- make a search over any web search engine about your selected subject with relevant keywords.
- Screen old and recent references (you may review quickly like 20 references), select the one or two highly cited references even if old (as some of them are reporting the basic ideas), then at least the most three important recent references after 2018.
- You may use Wikipedia (the English version) usually contains a lot of useful information and much more comprehensive than the Arabic version.
- After collecting at least 5 references (1-2 old important references, and at least recent 3-4 references), select the important sections and ideas.
- You may use Google translate, or similar, in translating some of the selected sections, then carefully review the and rephrase the translation. The automatic translation is poor for some sentences and leaving it as is means low quality report.
- Select all the keywords and search about their meanings in concise description. Add this part as an appendix 1.
- Then prepare the presentation using PPT using plain white template. Make the first slide contains the title of the project and the names of the authors in Arabic in full (4 names for each student)
- This is a suggested report structure*:

عدد الصفحات المقترحة	مقترح لبنيان التقرير	
1	عنوان الموضوع اسماء الطلبة بالعربي رباعية	
1	فهرس مبسط لأهم الموضوعات المتناولة في البحث	
1	تمهيد يشرح أهمية الموضوع	1
2	مقدمة تاريخية تأصل للموضوع وتتضمن المحاور الرئيسة للأبحاث والأعمال في الموضوع	2
12-15	تناول محاور العمل في الموضوع بشرح مبسط لكل منها مع الاكثار من الرسومات التوضيحية التي تيسر الفهم	3
2	المقارنة بين أفضل النتائج لكل محور من محاور العمل في الموضوع وخاصة لمواقع لها أكواد مفتوحة	4
3	شرح أهم المراجع التي تناولت كل محور مع التركيز على أى موقع عليه أكواد مفتوحة وقابلة للتجربة مع الاخبار عن نتائج استخدام هذه الأكواد والاشارة الى قواعد البيانات المستخدمة والتي اعطت هذه النتائج	5
1	الخلاصة والتوصيات	6
1	قائمة المراجع	
23-26	عدد صفحات التقرير	
2-3	ملحق 1: مسرد المصطلحات الواردة في البحث مع شرح مركز لكل مصطلح	
حسب الحاجة	ملحق 2: لو احتجت	

*Some subjects will not fit 100% with this recommendation, so feel free to redesign your report to fit your subject.

Some abbreviations for terms that have been mentioned in my subjects:

AI = Artificial Intelligence

ML= Machine Learning

NLP= Natural Language Processing

DNN= Deep Neural Network.....

Project subjects

Artificial Intelligence

1. AI definition, scope, and impact on the world progress, Main AI drivers (examples: Data, Algorithms and Hardware)
2. AI hardware:
 - a. review different GPUs, GPUs structures regarding: number of CUDA cores, memory, power consumption...etc.
 - b. Review for the available services on cloud like AWS, Google cloud...etc.

Data

3. Big Data in AI (types, characteristics, tools, examples...)
4. Data Processing for ML (collection, selection, annotation, cleansing, ...)
5. Tools for Data processing (collection, annotations, processing) and the most important companies working in this field companies.
6. Data Cleansing: meaning, why, how with examples.
7. Data Augmentation: meaning, why, how with examples.
8. Data Selection for better ML performance. If data is collected without considering a balanced selection to represent the real-life use, results will not be poor. For example, if we collect data for speech recognition but all of it is from male speakers, female speakers will get extremely poor results.
9. Active learning: it is a way to save some effort in data annotation and concentrate on the data that are useful for the system.

Text Processing

10. Natural Language Processing tasks (20 tasks): define each task (like Text summarization, Name entity recognition, ...etc.). you will need to define each task and give example(s).
11. GLUE and SuperGlue benchmarking for NLP with full explanation for each.
12. Recent advances in Text Summarization (algorithms, databases, open-source codes, etc.)
13. Recent advances in Document classification (algorithms, databases, open-source codes, etc.)
14. Recent advances in Semantic search (algorithms, databases, open-source codes, etc.)
15. Recent advances in Sentiment analysis (algorithms, databases, open-source codes, etc.)
16. Recent advances in Name entity recognition (algorithms, databases, open-source codes, etc.)

DNN Structures

17. Attention layers and transformers structures.
18. Self-learning algorithms: BERT Concept and BERT variants + available Arabic versions
19. GPT, GPT2, GPT3 with comparative analysis with other text DNN structures.
20. How to downsize the DNN structure through distillation, parameters tuning and fixed-point representation (could be 8 bits or even less) for the numbers...etc.
21. GAN definition, structures, applications including data augmentation.

Applications of ML and AI

22. Applications of ML and AI in Autonomous car driving
23. Applications of ML and AI in Medical Applications
24. Applications of ML and AI in Education
25. Applications of ML and AI in Agriculture
26. Applications of ML and AI in Business
27. Applications of ML and AI in Entertainment
28. Advances in Speech Recognition using DNN and its applications.
29. Advances of Robots using DNN.
30. Chatbots and Voice-Bots

Market size

31. Market size of AI, NLP and speech processing and other verticals like medical, transportation, robots...etc.
32. Market size for Data and data services, annotation tools for data for AI and for NLP.