Project COMP 264: Cloud Machine Learning

Introduction

Throughout this project assignment, each team needs to construct "A full stack serverless intelligent enabled application" using cloud Artificial Intelligence (AI) services.

The application will help address a real-world business problem that happens within the back-office processes of companies/organizations.

Many companies have sales representatives that visit potential clients or major conferences, trade shows/seminars, where they meet potential clients, they collect information about these potential clients through means of conversation and physical documents. To-date the business card is still considered as a major mean of introductions. Despite all the technological advancements, business cards are still irreplaceable. It seems that no amount of automation is going to take their place. Accordingly many companies use business cards to build a "Leads contact datastore" or "Potential contact datastore"; and have either dedicated teams in the backoffice, or if they are small, require their sales representatives to enter the potential customer information into the datastore.

The information is then used for targeted marketing and to establish/maintain the relationships. The inputting of this information is a time consuming and tedious job, not to mention that it requires and full stack IT infrastructure. Luckily, the advancements of OCR technology, cloud computing services and AI web capabilities in the fields of NLP and image recognition can make this task easier.

Over the course of six weeks each team will research, design, build and test a serverless web-based application. The application is to make the task of populating the "Leads contact store" on the cloud much easier, by intelligently detecting the potential contact information from the business card. The teams will research and use the technologies mentioned under the technology stack section.

The project would be governed by a set of deliverables and there are certain check points with the professor, as illustrated in the project timetable key-milestones section.

deliverables will be evaluated based on the rubric illustrated in the Rubric section. Grading is both at the team level and at the individual level.

A project plan should be built by the team and updated on a weekly basis, in addition, a simple log of all team meetings should be maintained. Both should be submitted with final project documentation and code as appendices to the project report.

At the end of the project, the team needs to present their work to the class.

Data sets

You will use the Stanford business cards dataset available at
https://web.cs.wpi.edu/~claypool/mmsys-dataset/2011/stanford/mvs_images/business_cards.html

Each team will select 10-20 business card images for testing their application.

Please reference the publishers of this dataset, in your report.

Technology stack:

Programming language backend: Python

Programming language frontend: Any frontend framework that supports RESTful architecture.

Data storage: aws S3, DynamoDB

Software development toolkit: aws Boto3

Serverless framework: aws chalice

Testing: local host

Operating system: Linux

AI services: aws recognition or aws Textract the team needs to decide which to use or use both. Aws comprehend and aws medical comprehend, again the team needs to decide which to useor use both.

Architecture: RESTful api , function as a service (FaaS)

Deliverables:

1. Research requirements:
    a. Provide a summary of options in the market for AI enabled business cards organizers.
    b. Provide a summary of the ML/DL algorithms used to understand the information in the business card. (You will need to check for white papers)
    c. Provide a summary of each element of the technology stack used for the project and how it will contribute to the project.
2. App requirements:
    a. User should be able to load an image of the business card to the system and the solution should detect the following:
        i. Name
        ii. Telephone number (s)
        iii. Email address
        iv. Company website
        v. Company address
    b. For elements detected the user should be allowed to update the elements before they are stored into a DynamoDB table which will act as the “Leads contact” datastore. (“Human in the loop”)
    c. Retrieval: User should be able to retrieve data from the “Leads contact datastore” by lead name.
    d. Any other functionalities the team will come up with beyond items a-c will be consider as part of the creativity (10%)

3. Design document:
    a. List of functional requirements.
    b. Design graphs illustrating:
        i. Architecture of the solution. This should make clear all the endpoints and the AI stack layers (you can use Microsoft Visio)
        ii. Interaction diagram illustrating the interactions between the various components of the solution (you can use Visio)
        iii. List of private and public endpoints.
        iv. User interface mockup (you can use wire or any other software)

The design should take into consideration the software design principles “ Separation of concerns” and “single responsibility”. In addition, to eliminating as much as possible, the dependency on the cloud vendor, for future portability of the application to a different cloud vendor.

Timetable – key milestones

Milestone	Week #
Project teams assembled	6
Team reads the scope and carries out research activities on the technology stack required. Research available solutions from other providers.	8
Team setups up the project IT structure and development environment with the necessary framework and the cloud services and roles.	8
Build the design documents	9
Check point # 1 “Review research output and design documents”	9
Develop serverless application & frontend	10
Develop serverless application & frontend	11
Check point # 2 “Code review”	12
Testing & Prepare report	13
Presentation & submission	14

Peer-evaluation

With final submission, each team member should fill in the peer evaluation form and submit it to the assessment box named "Peer evaluation Phase X", where X is 1 or 2. This form is confidential, and only the professor will access it. In summary, this form is to express what each team member has worked on and how the team member views the contribution of the rest of the team members. If all team members have contributed equally, then give all a rate of 100%, if a team member did not contribute then give a 0%, finally, if a team member contributed but not to the level of the team agreement, then a score between 1% to 99%.

Project Report requirements:

1. Cover page
2. Table of contents
3. Research results specified in the deliverables section.
4. Design documents specified in the deliverables section.
5. Future work: Suggest enhancements.
6. Final conclusion.
7. Assumptions.
8. References.
9. Appendix 1: Project plan.
10. Appendix 2: Meeting register, simple table showing date and time of each meeting, who attended, subjects discussed and assignments.

Presentations requirements:

1. All team members need to participate.
2. Present working code.
3. Present power point summarizing key points related to the project, especially the design.

Rubric

Evaluation criteria	**Not acceptable**	**Below Average**	**Average**	**Competent**	**Excellent**
	0% - 24%	**25%-49%**	**50-69%**	**70%-83%**	**84%-100%**
Research 5%	Reseach not carried out.	Identified no useful sources. All information was irellevent.	Identified a few useful sources. Located and summarized some useful information that helps the project development. Presented information which was poorly organized. Not all refernces were listed.	Identified mostly useful sources. Located and summarized most useful information that helps the project development. Presented most of the information in a clear and organized way. Listed all references used.	Identified useful sources. Located and summarized useful information that helps the project development. Presented all information in a clear and organized way. Listed all references used.
Design 15%	Design documents not provided or what is submitted is completely irelevent.	Architecture design diagram submitted with many serious mistakes and no explanation. Component interaction design diagram submitted with illogical flow between componenetes and no explanation. No design decisions are listed or what is listed is irrelevant.	Architecture design diagram submitted with some major mistakes and somewhat explained in words. Component interaction design diagram detailed with major mistakes and smewat explained. All designed decisions are listed with some explanation and no justification.	Architecture design diagram submitted and somewhat explained in words. Component interaction design diagram detailed with minor mistakes and smewat explained. All designed decisions are listed with some explanation and justification.	Architecture design diagram submitted and clearly explained in words. Component interaction design diagram detailed with no mistakes and explained. All designed decisions are listed with clear explanation and justification.
Code 55%	Code not submitted or minimum code submitted.	Non-modular, and does not follows the design documents, not documented. Use of unrelated naming for modules classes and functions. Either front end or back end not working.	Modular, follows the design documents, and the main design principles, not well documented. Use reasonable naming for modules classes and functions. Both front end and back end are working but with major issues.	Modular, follows the design documents, and the main design principles, well documented. Use reasonable naming for modules classes and functions. Both front end and back end are working but with minor issues.	Modular, follows the design documents, and the main design principles, well documented. Use reasonable naming for modules classes and functions. Both front end and back end are working efficiently.
Project report 5%	No Report submitted.	Has no clear introduction or has an irrelevant introduction; gives	Has introduction relevant to the topic and gives a clear outline; is not	Has introduction relevant to the topic and gives a clear outline; is mostly	Has a clear introduction & outline that catches reader's interest; maintains focus throughout; summarizes main

		reader no focus or outline of the report. Appendices are or references missing.	organized; has many repetitions the reader would get confused. Key conclusions are missing. Appendices or references are missing.	organized; provides adequate “road map” for the reader, summary of conclusion scattered throughout the report. Appendices and references are incomplete.	points. Follows all report requirements. Refences are listed.
Presentation / Demonstration 10%	Team completely not ready for presentation.	Some team members do not participate. All read off the slides. Team demonstrates little grasp of information. In response to question the team has undeveloped or unclear answers.	Some team members participate in the delivery; Some team members read off the slides. In response to questions the team shows hesitance in answering questions and does not elaborate.	All team members participate equally in the delivery; Some team members read off the slides. In response to questions the team shows ease in answering questions but does not elaborate.	All team members participate equally in the delivery; Team projects enthusiasm, interest, and confidence. In response to questions demonstrates full knowledge of topic.
Creativity 10%	No suggestion or implementation of new relevant functionalities service enhancements /techniques	Team suggests new non-relevant functionalities service enhancements/techniques without implementation	Team researches new relevant functionalities service enhancements/techniques and any without implementation.	Team researches and demos new relevant functionalities services/techniques and implements them with a few mistakes.	Team researches and demos new relevant functionalities service enhancements/techniques and implements them efficiently.