



PhUSE US Connect 2019

Paper ML08

An Overview about the PhUSE Machine Learning / Artificial Intelligence Team Project

PhUSE Machine Learning / Artificial Intelligence Team Members

ABSTRACT

The most popular buzz words nowadays in the technology world are “Machine Learning (ML) and Artificial Intelligence (AI). Most of the industries are implementing ML/AI but it is still developing within pharmaceutical industry. To advance broad understanding, PhUSE recently started the ML/AI project team to raise the awareness of ML in Pharmaceutical industry, to explore ML application, to provide ML education framework and to collaborate on actual ML projects such as chatbot creation, image classification, NLP and more. The presentation will introduce PhUSE ML/AI Team, its sub-teams (Industry application, Chatbot Project, SDTM mapping project, publication) and each sub-team's goals, objectives and current projects. The presentation will also discuss about current and future ML/AI implementation in pharmaceutical industry and how statistical programmers and statisticians can prepare for this next disruptive, innovative technology.

SCOPE

This paper will introduce PhUSE ML/AI project team, its sub-teams (Industry application, Chatbot project, SDTM mapping project, publication/communication), its goals and current objectives. It will discuss about current and future ML/AI implementation in Pharmaceutical Industry and how statistical programmers and statisticians can prepare for this next disruptive, innovative technology. This paper will discuss the mechanism for future members to join and contribute to this ML/AI project and provide all source information such as weblinks etc.

CHALLENGES FOR PHARMACEUTICAL BIOMETRICS

ML/AI has been innovating and changing many Industries, but still new and evolving In the Pharmaceutical Industry. With the fast evolution and wide spread use of ML/AI in other Industries, it is apparent that Pharmaceutical Industry needs to adapt and implement these new disruptive technologies. In the pharmaceutical Industry work force, especially statistical programmers and statisticians need to understand the importance and potential of ML/AI, to educate themselves in the ML/AI space, and to implement ML/AI in Pharmaceutical industry. The team wanted to answer the question: How could we, as programmers and statisticians, educate ourselves from other Industries and from trove of information available on internet to improve and be ready for the future?

OBJECTIVES OF PHUSE ML/AI TEAM

- To raise the awareness of ML in Pharmaceutical industry
- To explore ML application in other industries and learn
- To provide ML education framework for Pharmaceutical Industry
- To collaborate within Pharmaceutical industry for actual ML projects such as chatbot creation, image classification, NLP and more

ML/AI Team wants PhUSE community to lead the next disruptive, innovative technology – ML/AI and work together to reach the goals.



ML/AI TEAM PROJECT SUB-TEAMS

The project approached this problem statement by forming five sub-teams. Each sub-team tasked with research and project goals and objectives unique to each sub-team. Each sub-team comprises of many individuals who contribute in gathering ML/AI related information from available literature and doing projects as per their sub-team goals and objectives. The goals and objectives of each sub-team are described in below sub-team section.

PROJECTS SUB-TEAM

Introduction:

Machine Learning Project sub-team explores and conducts simple and interesting Machine Learning projects. Project sub-team members will follow some basic steps (data preparation, algorithm selection, model training, validation of trained model, prediction) of actual Machine Learning projects. The Machine Learning projects sub-team will conduct the actual projects, share with PhUSE community, and create contents / blogs / White Papers about findings / experiments / results for PhUSE community.

Goals:

1. To explore some of the possible Machine Learning projects, which are specific to Pharmaceutical Industry and learn Machine Learning implementation.
2. To learn how to conduct simple Machine Learning projects.
3. To conduct the simple Machine Learning projects specific for Pharmaceutical industries.
4. To share findings and results with PhUSE community.
5. To publish the contents of Machine Learning projects

What we are doing?

Project sub-team is now working on a couple of projects and exploring many projects.

- Development of Chatbot using IBM Watson Assistant – The chatbot is one of the most popular Machine Learning implementations. The team will learn about Chatbot development and Machine Learning Natural Language Processing concept. The team choose easy-to-use IBM Watson Assistant as a tool to develop Chatbot creation. The project created a common working area in IBM Watson and will build chatbot together. The team will also create contents to publish how to build chatbot using IBM Watson Assistant via Squarespace.
- SDTM development using Machine Learning algorithm – The project will explore how to develop SDTM using Machine Learning algorithm.
- ADaM mapping
- CRF mapping
- Pharmacovigilance
- Image (X-ray) Recognition
- Machine Learning Ecosystem - Python, R, SAS, IBM Watson, Google Cloud, MS Azure, AWS

How this contributes to Industry:

Machine Learning projects seems different and difficult to the beginners. This sub-team will introduce ML project, conduct together and provide results and findings to help people learn about the projects faster and easier. It will also provide starting points for more complex Machine Learning projects in the Pharmaceutical Industry.

Lead: Kevin Lee

PHARMACEUTICAL INDUSTRY ML IMPLEMENTATION / APPLICATION SUB-TEAM

Introduction:

General interest in Artificial Intelligence and Machine Learning has been growing for quite some time and it has significantly increased relatively recently due to enhanced technological capabilities and advances in other Industries. In Life Sciences, we are frequently looking for ways to:

- Streamline processes
- Enhance the quality of deliverables



- Find opportunities to make data available earlier in the study life cycle
- Derive additional data insights
- Identify additional use cases and applications resulting from new technologies

ML/AI is felt to potentially address most of these items. The challenge is with understanding how it works and then how it can properly and most effectively be implemented to meet these objectives.

Goals:

1. To provide ML implementation in Pharma Industry
2. To explore and introduce future implementation

What we are doing?

- The "Industry Applications" sub-team's mission is relatively simple, i.e., "find it, or else propose that it be built". As such, we have been meeting bi-weekly to:
- Build an inventory of existing or proposed ML/AI applications in LS via research of our team members, both:
- within our organizations – by querying other functional units (so that we are not solely representing programming and biostats); and,
- as these applications are shared or discussed publicly
- Present and discuss any new entries or new information resulting from our research

Share our results with the other sub-teams for further consideration and action, e.g., to consider as additional training topics / focus or as potential POC development projects

How This Contributes to Industry:

This sub-team focuses on identification of early adopters of ML/AI and other potential applications not yet found in the Life Sciences space, so that we may:

- become aware of the existence of these applications
- learn from the efforts of early adopters
- become incentivized to identify new applications
- further fan the flame of ML/AI adoption by reducing / alleviating both the *mystery of* and *concerns with* such adoption

Leads: Tom Kalfas, Jay Gohel

PUBLICATION (WHITE PAPERS, PHUSE PRESENTATION) SUB-TEAM

Introduction:

With the advancement in technologies in the recent years, the application of Machine Learning (ML) and Artificial Intelligence (AI) in Pharmaceutical Industry is increasing. They are looking into new innovative ways to find treatment for patients and be able to provide healthy lifestyle for patients. The application of ML/AI is increasing at a very fast rate, so with this sub-team we want to be able to participate and present in ML/AI related conferences and bring back the knowledge to the sub-team.

Goals:

- To participate in PhUSE ML activities such as conferences, SDE's or other ML conferences / meetings
- To publish ML papers, presentation and White Papers



What we are doing?

As a sub-team we meet monthly to discuss topics like:

- Events and conferences on ML & AI – We want to participate and present in conferences that are focused on ML/AI
- New application of ML/AI – We want to publish papers on new applications of ML/AI. The purpose of publishing the White Paper is to educate people in new applications of ML/AI that various Industries are adapting and advantages of these applications.

How This Contributes to Industry:

Brings ML/AI related knowledge gathered and curated by PhUSE ML/AI project to broaden statistical programming and statistician's communities in Pharmaceutical Industry through conferences and publications.

Leads: Sairam Gorthi, Karnika Dalal

HOW TO JOIN AND CONTRIBUTE

If you are interested in joining any of these projects, please email workinggroups@phuse.eu

FINAL THOUGHTS

Machine Learning and Artificial Intelligence will have a huge impact on the Pharmaceutical Industry. Its market is estimated to increase from 300 million in 2016 to 10 billion in 2024, expecting more than 40% annual growth rate. And our Industries are short in talent. This will be a great opportunity for biometric departments – statistical programmers and statisticians. Biometric departments can lead this disruptive technology and be a center of innovation in Pharmaceutical Industry. PhUSE Machine Learning project team believe that contents each sub-team creates, will help statistical programmers and statisticians to learn more about Machine Learning & Artificial Intelligence and apply to their work and lead this disruptive innovation in the Pharmaceutical Industry. We also need more volunteers to help us to think outside of the box and create the contents for the wider PhUSE community.

ACKNOWLEDGMENTS

We like to express our appreciation to all the Machine Learning / Artificial Intelligence project team members for their dedication, time, hard work and continued support.

PROJECT CONTACT INFORMATION

If you have any questions or comments or interested in joining any of the sub-teams, please contact our ML/AI team leads or sub-team Leads.

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