

MOSS

A Natural Language Based
Clinical Monitoring Assistant

PHUSE US Connect 2019

ANOOP P AMBIKA

anoop.ambika@genproindia.com

GENPRO



ABOUT US

A life science services company that develops innovative services and solutions to augment research across multiple clinical study phases and therapeutic areas

GENPRO
BOSTON, USA

GENPRO
TRIVANDRUM

Problem Space

- ▶ TIBCO Spotfire, Tableau and QlikView are common tools used by clinical data visualization teams
- ▶ Clinicians rely on visualization and data teams to get answers to their questions which is often turn time consuming and frustrating
- ▶ Resource Hog in terms of people, license and computing

Inspite of all these efforts,

**Are you getting the right answers
about your clinical data ?**

Solution

Connect your EDC or CDISC datasets to MOSS

Just Ask your question and you will get your answer

MOSS

Adverse events

Dashboards

Pin your results and create custom dashboard

1 Result pinned

+ Quick dashboard

Saved Dashboards

Adverse events

Dashboard name

Dashboard name

Dashboard name

TRIAL 1

Adverse event

DISPLAY AE REL

Tier 1

QUESTIONS HISTORY

CLEAR ALL

DELETE DASHBOARD

FORMATION

Unpin

Tier 3

Tier 4

Tier 5

Here are some quick suggestions for you on adverse events

Count of unique AEs

Show me the count of unique AEs

Show the count of unique adverse events

Which SOC has maximum number of patients

Display AE related information

Display the unique AEs

Display AE related information

Display the most frequent AEs by EPOCH

Different Approaches



WikiSQL

- ▶ **COMPETITION DATASET**

80654 natural language questions and SQL from 24241 wiki tables

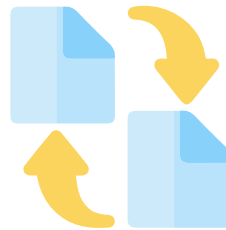
- ▶ Input table schema, question and predict the SQL
- ▶ Continuous improvement by reinforcement learning
- ▶ Does not take care table joins

Different Approaches

Multiclass Classification



Define the classes from
the dataset



Train a model to learn
the class properties



Map a new question to
any one of the
predefined classes

Different Approaches



Neural Machine Translation

- ▶ **MACHINE TRANSLATION**

The task of automatically converting source text in one language to text in another language

- ▶ **NEURAL MACHINE TRANSLATION**

An approach that uses a large artificial neural network for converting source language to another

- ▶ **THE STRENGTH OF NMT**

Ability to learn directly, in an end-to-end fashion, the mapping from input text to associated output text

Example :

Opennmt (Open Source Neural Machine Translation System)

Different Approaches



NLU Models

- ▶ **NATURAL LANGUAGE UNDERSTANDING (NLU)**
Branch of artificial intelligence (AI)
- ▶ Uses computer software to understand input sentences and make sense of it
- ▶ NLU models uses algorithms to reduce human speech into a structured ontology
- ▶ It can pull out things such as intent, timing, locations and sentiments

Example :

RASA NLU model mainly used for chatbots

Platform Capabilities



- ▶ An AI Powered NLP based Clinical Data Visualization tool
- ▶ Continuous Learning Engine which will capture the user query patterns and update the models accordingly
- ▶ Support multiple Charts, Graphs and Statistical Analysis
- ▶ Clinicians can create dashboards for different sites, trials, patients etc.
- ▶ Maintains question history so that questions can be recommended
- ▶ Voice Interface for ease of use
- ▶ Scalable SAAS /On-Premise installations
- ▶ CFR Part 11 Compliant

MOSS Applications



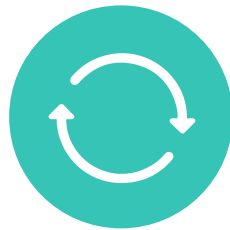
Data Validation



Safety Analysis



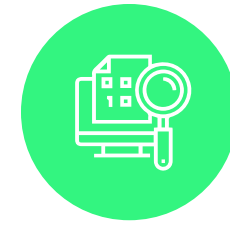
Pharmacovigilance



Signal Detection

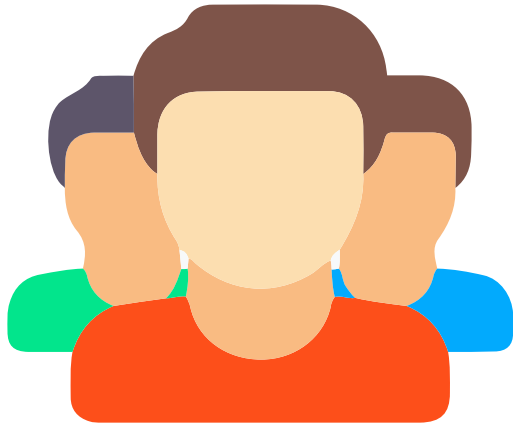


Clinical Analysis



Remote Monitoring

Potential Users



- ▶ Clinical Data Monitors
- ▶ Clinical Data Management
- ▶ Biometrics
- ▶ Regulatory Affairs
- ▶ Remote Monitoring Teams

Case Study



- ▶ Piloted at a CRO on 5 ongoing oncology studies
- ▶ MOSS powered the Clinical Data Visualization to the sponsor
- ▶ Convenience to monitor was the highlight
- ▶ Cost Savings on yearly licenses
- ▶ Ease to connect to the datasets and visualize
- ▶ Voice interface for easy access
- ▶ Patient Narratives

Pharma Adoption



- ▶ Need a team to adopt the platform
- ▶ Decision on On-premise Vs SAAS
- ▶ Select a TA and a Study to pilot
- ▶ Develop question banks for the TA
- ▶ Establish a deep learning pipeline

Dashboards

MOSS

Ask questions here...

Dashboards

Pin your results and create custom dashboard

0 Results pinned

+ QUICK DASHBOARD

Saved Dashboards

Default Dashboard

CLP-TRIAL-01

Question history

clear all

show frequency of mild moderate and severe advers...

Pin it

MILD

MODERATE

SEVERE

list sites with number of treatment emergent adverse...

Pin it

count

60

40

20

0

9

514

513

520

503

522

515

801

519

516

523

1

55

34

31

22

22

13

13

12

11

8

3

2

SITEID

Patient Narratives

MOSS

Ask questions here...

Dashboards

Pin your results and create custom dashboard

0 Results pinned

+ QUICK DASHBOARD

Saved Dashboards

Default Dashboard

CLP-TRIAL-01

Question history

Default Dashboard

clear all

display patient narrative for subject mos-040-0001-170

Pin it

Study	MOS-TST
Patient	MOS-040-0001-170
Age	64
Sex	MALE
First Dose Date	2014-10-21T11:30
Last Dose Date	20-11-2014

Patient MOS-040-0001-170 is a 64 -year-old MALE who was first diagnosed with multiple myeloma on 7/10/2014

Prior to enrolling in the study, notable medical history is provided in Table 1. The patient initiated dosing with Study Medication on 2014-10-21T11:30. Adverse events , Concomitant medications, and supportive care are provided in Tables 2 and 3

Contacts

ANOOP P AMBIKA

+1 617874 7795

+91 471 270 0851

anoop.ambika@genproindia.com