

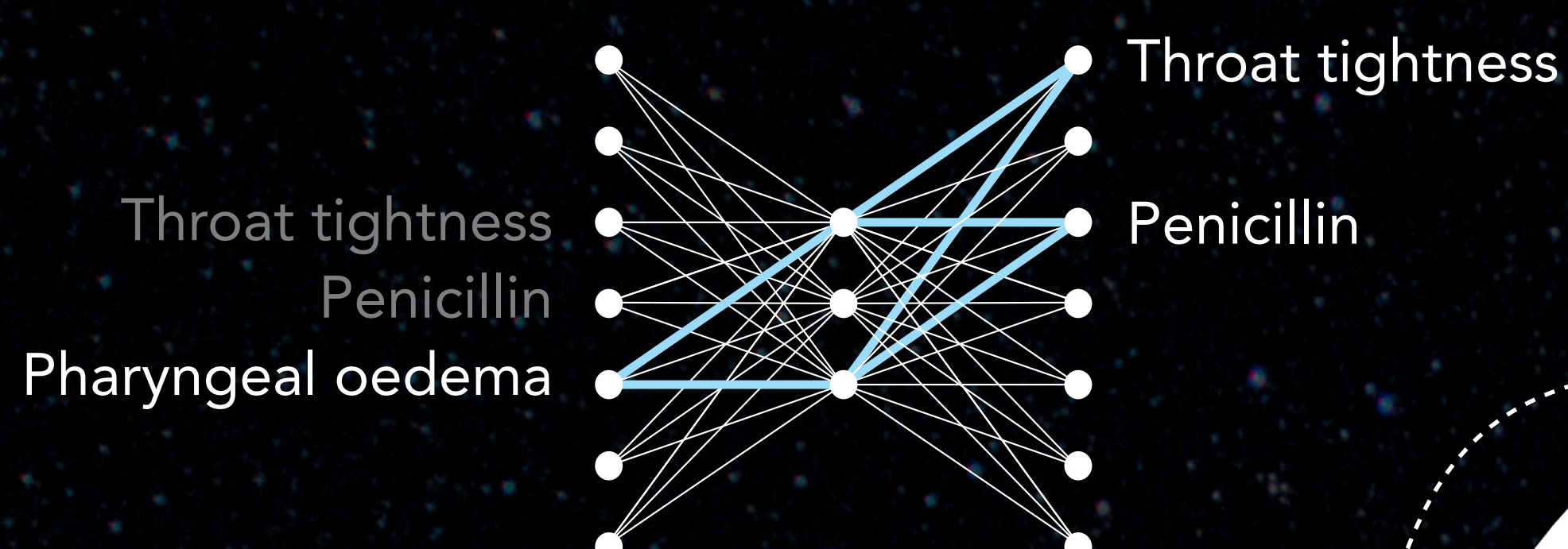
# Artificial intelligence applied: data-driven vector representations of adverse events and drugs in pharmacovigilance

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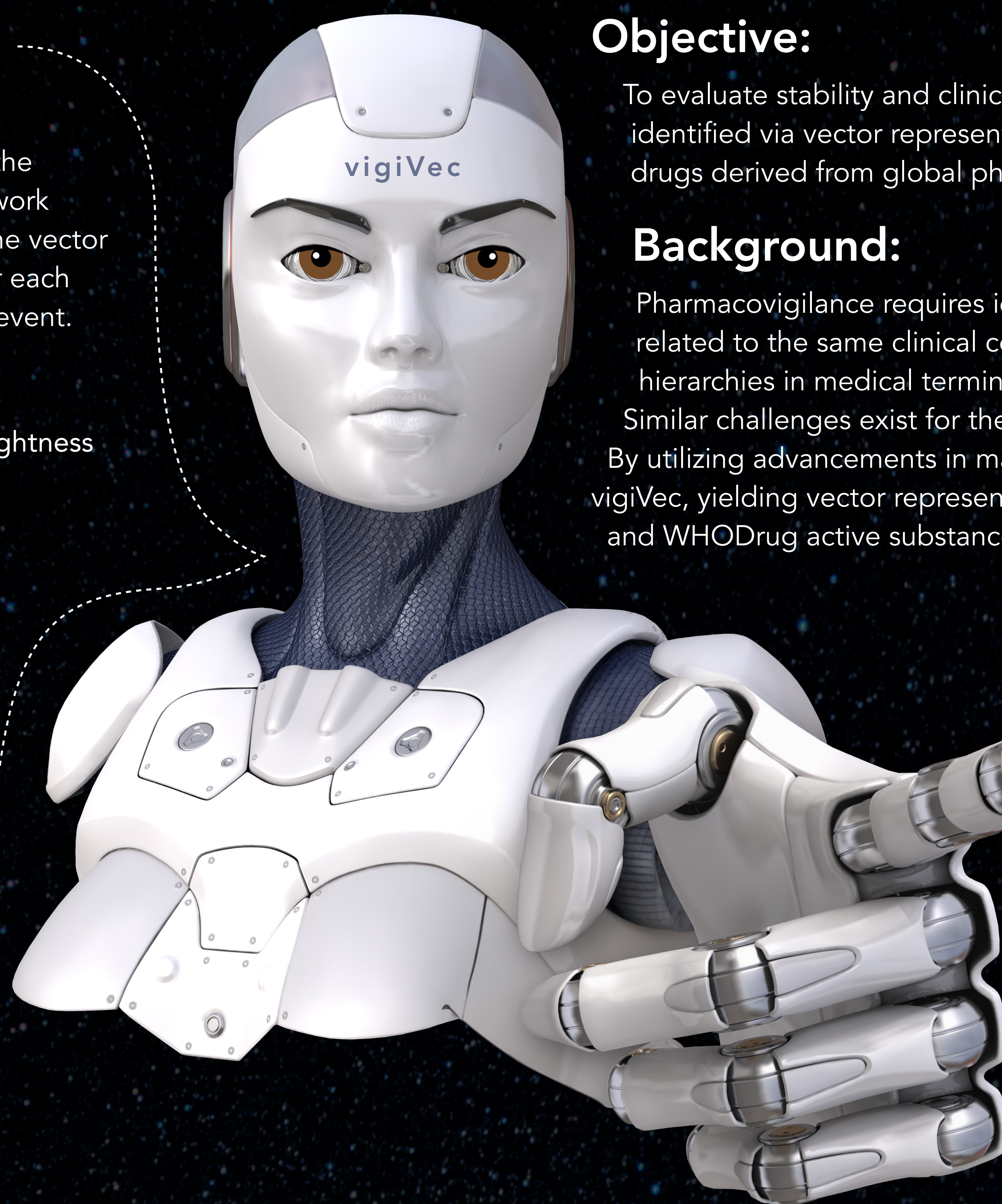
## Methods

We train a **Word2Vec** Skipgram neural network model with 20 dimensions to predict co-reported drugs and adverse events on each report in VigiBase.

The weights from the trained neural network are then used as the vector representations for each drug and adverse event.



VigiBase



## Objective:

To evaluate stability and clinical relatedness of nearest neighbors identified via vector representations for adverse events and drugs derived from global pharmacovigilance reporting patterns.

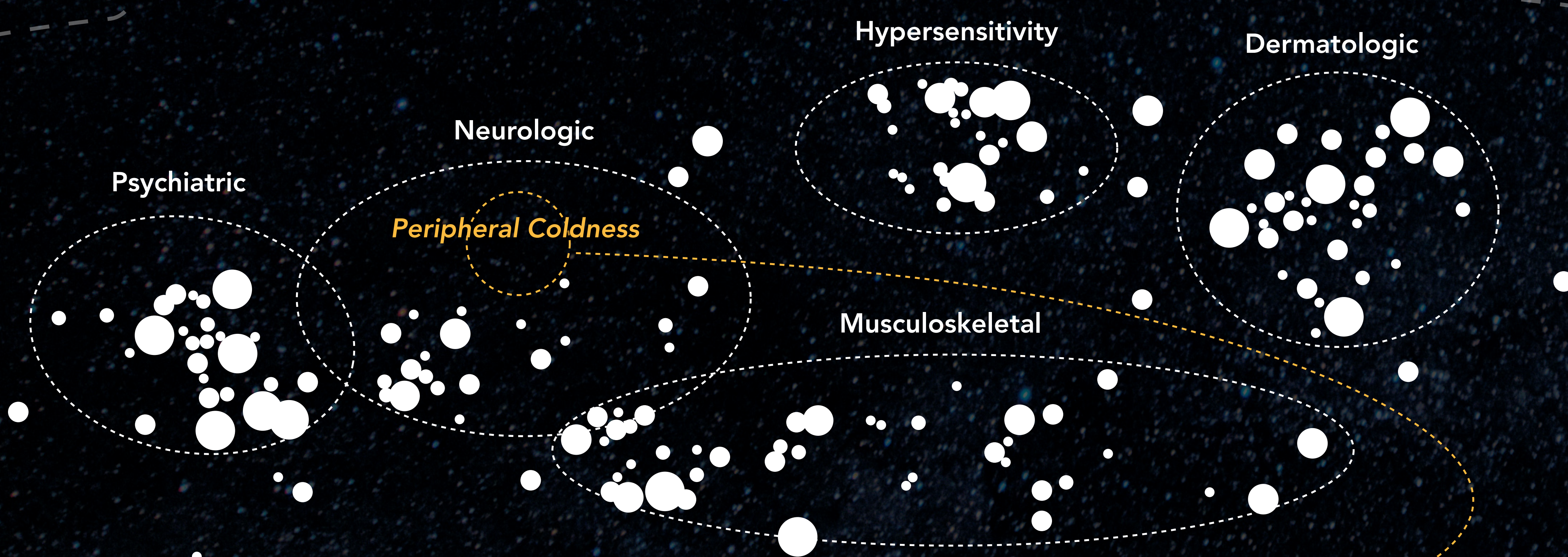
## Background:

Pharmacovigilance requires identification of adverse event terms related to the same clinical condition, and solely relying on hierarchies in medical terminologies is often not sufficient. Similar challenges exist for the analysis of medicinal products. By utilizing advancements in machine learning UMC has developed **vigiVec**, yielding vector representations of MedDRA preferred terms and WHODrug active substances.



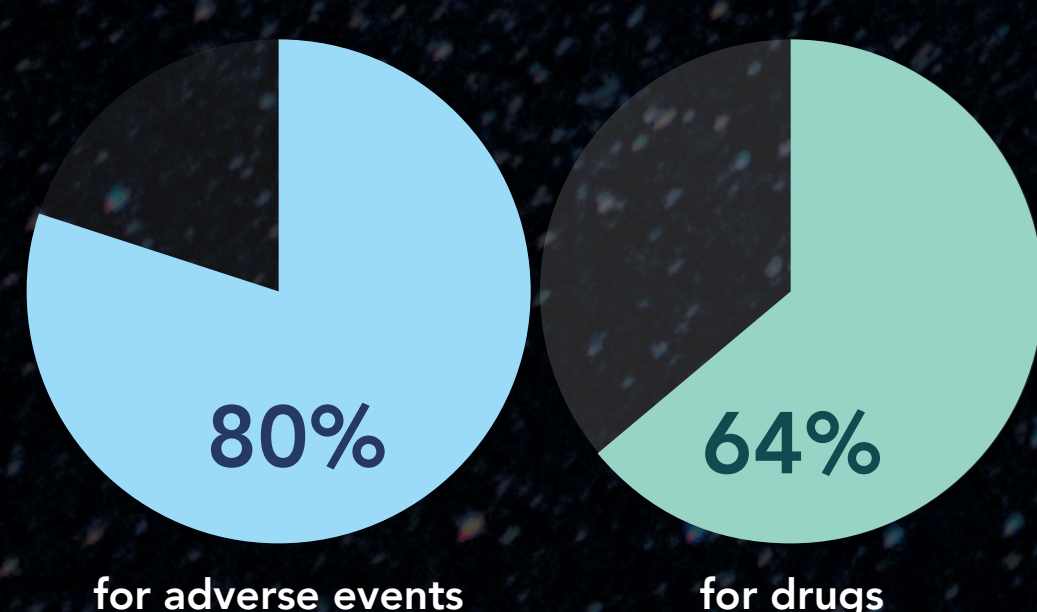
- Shared MedDRA SMQ
- Shared MedDRA HLT

## Results



## Stability

The stability was measured as the average overlap in the ten nearest neighbors for each adverse event or drug, in repeated fitting of **vigiVec**.

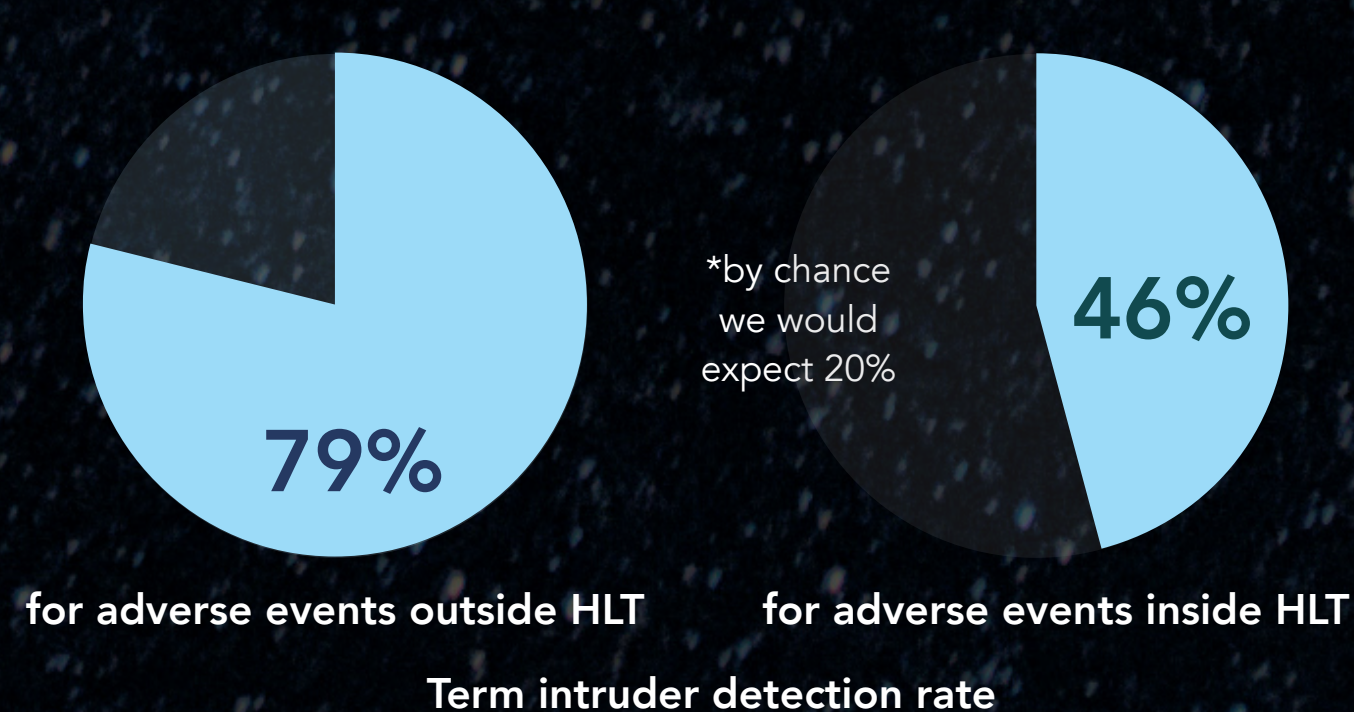


## Conclusions

The semantic representations of **vigiVec** are stable and show a high level of clinical relatedness. Data-driven identification of clinically related adverse events and drugs may complement existing medical hierarchies, supporting domain experts in pharmacovigilance.

## Clinical relatedness

Clinical relatedness was measured through term intruder detection, where a medical doctor was asked to identify a **random intruder** among the four nearest neighbors to a specific adverse event or drug.



### Peripheral Coldness

- Feeling hot
- Feeling of body temperature change
- Sensation of blood flow
- Hangover
- Feeling cold

