WHY INTERPRET MACHINE LEARNING MODELS ?

Horizontal Applications

Means that it is applied to **various businesses or across different types of businesses.**
Some of the applications are in MARKETING -> predicting value , churn modelling, recommendation algorithms, channel optimization, discount targeting(like POWER of HABIT example), ad Buying,etc.

The approach of Jeremy explained through Churn.

->CHURN MODELLING - It is basically figuring out when someone is going to leave your company or leave the workplace. How can we apply Jeremy's approach?

STEP 1

- **My objective is here to predict the people or customers who are going to leave next month. It is the most important thing as you can't move correctly unless you know what you are moving toward.**

STEP 2

- **Levers are the things that an org. can do to actually drive the things in their favour or help them reach their objective.**
- **They are the actual THINGS THAT WE CAN DO.**
- **Like here, in churn, you can you know call someone and ask what is it that you are not particularly happy about or maybe if your model predicts the 'customers' who are going to leave you can maybe change the price of your product and maybe give them some offers or discounts which makes them stay.**
- **BUILDING A MODEL IS NOT A LEVER. It is a way to identify which features are most important and out of them WE have to choose which are levers.**

STEP 3

- **What DATA do I or the org. has or can collect so that the 'levers' can be turned.**
- **For example, if we are working with telecom. and we want to figure out PHONE PAYMENT FRAUD like who's not going to pay for the phone over the period of**

the EMI, so we have to focus on the DATA we can get while the customer is in the shop not the data we already have.

STEP 4

- **We have predictive, simulation and optimization models.**
- **Predictive models are just models which, on the basis of previous behaviours, predict outcomes similar to them. Eg. if I have read all the books of a particular author a predictive model would recommend me the author's complete collection as I don't yet have that.**
- **The above model has a flaw though as it is very less likely that I am going to buy a collection of the books by the same author whose books I have individually. Also this model does not change my buying behaviour as I have not been directed to a new author and thus DOES NOT HELP THE COMPANY IN SELLING MORE BOOKS.**
- **Optimization models are based on simulating outcomes.**
- **How-> If we showed a person a particular ad how likely is he then to go on to buy this book and if I don't show him this ad how likely is he then to buy this book. The latter case is called the COUNTERFACTUAL, just what would have happened otherwise.**
- **Now what could we do? We could then MAXIMISE THE LIKELIHOOD OF THAT PERSON BUYING THE BOOK. How? example-> by RECOMMENDING ANOTHER AUTHOR who is popular amongst the people that have read the author that the current person has read.**
- **The above would change the person's pattern and maybe even maximise our profit in the company.**
- **Simulation models are just a way to CALCULATE the effectiveness of a lever. In this model we simulate things and see ,with probability, which changes maximised the change or outcome.**
- **Like in churn, suppose we have a predictive model saying that a particular employee is going to leave the next month. Now we would have certain things we could do like call him or email him and then we would analyse how that would affect his or her decision of leaving.**
- **Suppose we email him by saying that we are going to give him an increment in his salary, what's the probability that he is going to change his behaviour i.e. not leave.**

So we are seeing that this modelling is more about the interpretation rather than prediction.

A good use of the Random Forest Feature importance is that suppose we have a bunch of levers we can pull and we have Random Forest Feature Importance.
So the important features which are actually included in the levers are the LEVERS THAT MATTER.

WHY->

- **If it is not important then changing won't matter**
- **If it is important and we can't change it then also it doesn't matter. Eg. If temperature is the driving factor of the people buying a certain kind of heater then although it may be the most important feature but you can not control the climate.**

>SOME IMPORTANT FEATURES OF DIFFERENT MODELS

Fraud Detection - You obviously want a predictive model but here there is a catch. Your model must detect the **FRAUD** at the point you are going to provide your service or you know make him or her your employee not after a month when a fraud could happen. So you have a data constraint that you would have to detect if a particular person is going to commit fraud looking at the **data available**, **not the data that you will have**.

Vertical Applications

Means it is applied across a particular market or industry or a business.

- **Healthcare Applications**

Medicare/medical aid fraud, Medical Resource allocation, physician attrition(Staff **attrition** refers to the loss of **employees** through a natural process, such as retirement, resignation, elimination of a position, personal health, or other similar reasons.), Readmission risk, etc.

An example -> Readmission Risk is the probability that a patient will have to be readmitted to a particular hospital after it has left it.

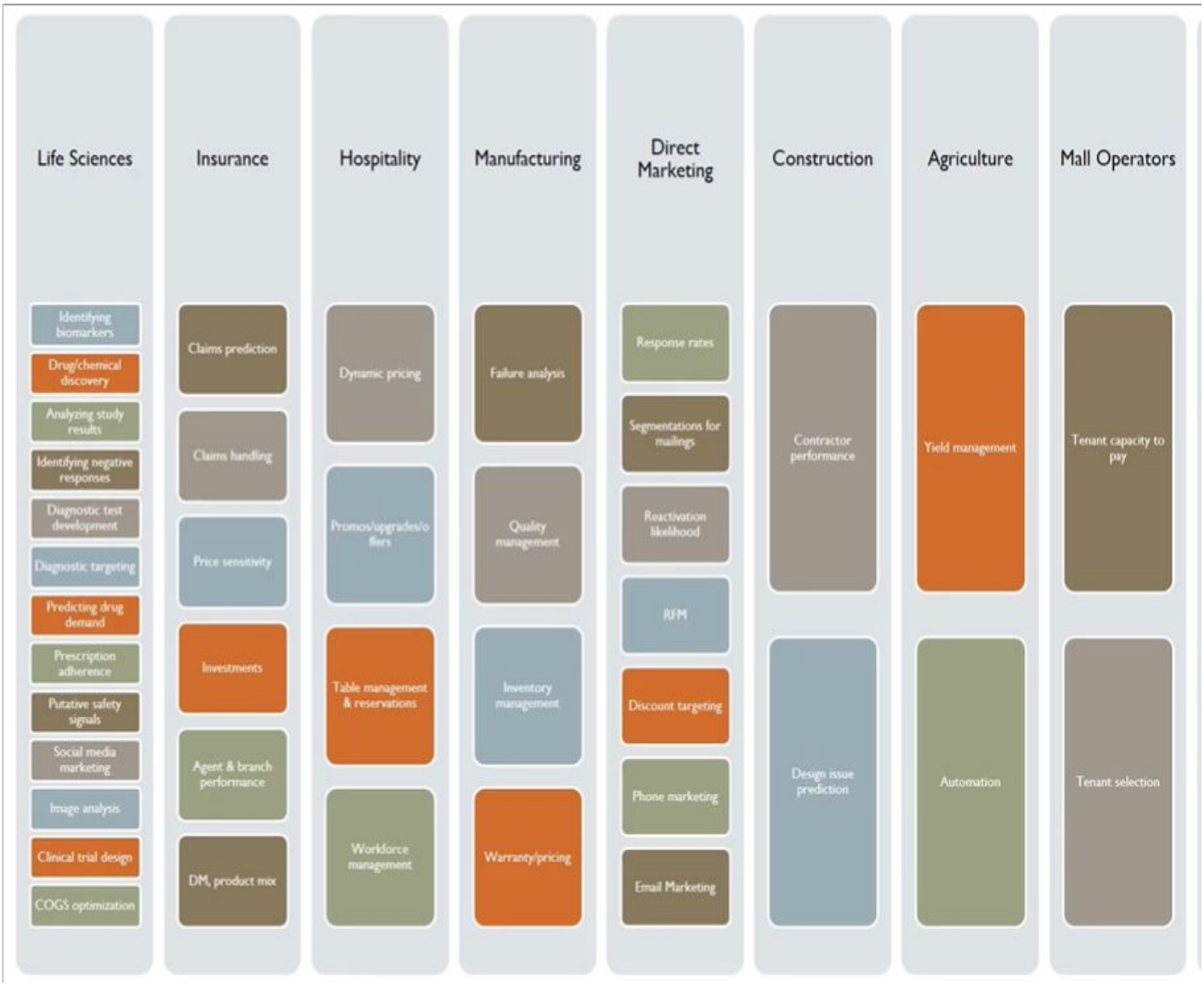
This would be a problem for the hospital as its **credibility** would degrade.

THIS CAN BE TACKLED VERY NICELY WITH **TREE INTERPRETER.**

WHY? As a tree interpreter actually gives you **HOW** the readmission risk has been affected with all the variables present in your data. So if, for example, you have a high readmission risk for a person then **THE TREE INTERPRETER WILL GIVE YOU THE REASON HOW IT BECAME HIGH.** Then you can track down the path for that data entry and look which contributed most and then maybe it turns out as a '**LEVER'.**

- **Travel Applications**

Aircraft Scheduling, Seat/Gate management, Air Crew scheduling, Maintenance optimization, Tourism forecasting.



GENERAL APPLICATIONS …