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OCTOBER 22-25



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Using AI to Improve The Customer Experience

Bernard Burg
Sr Manager Data Science
Comcast



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OPERATIONAL TRANSFORMATION



Using AI to Improve the Customer Experience

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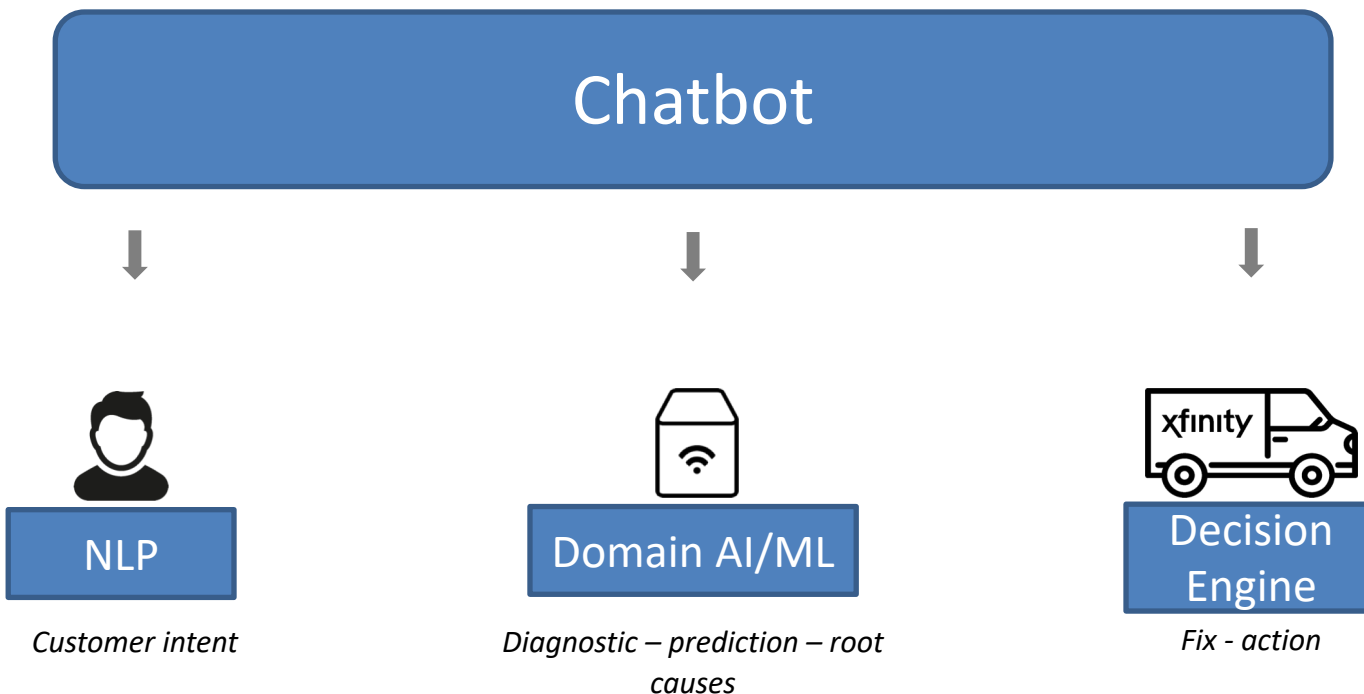


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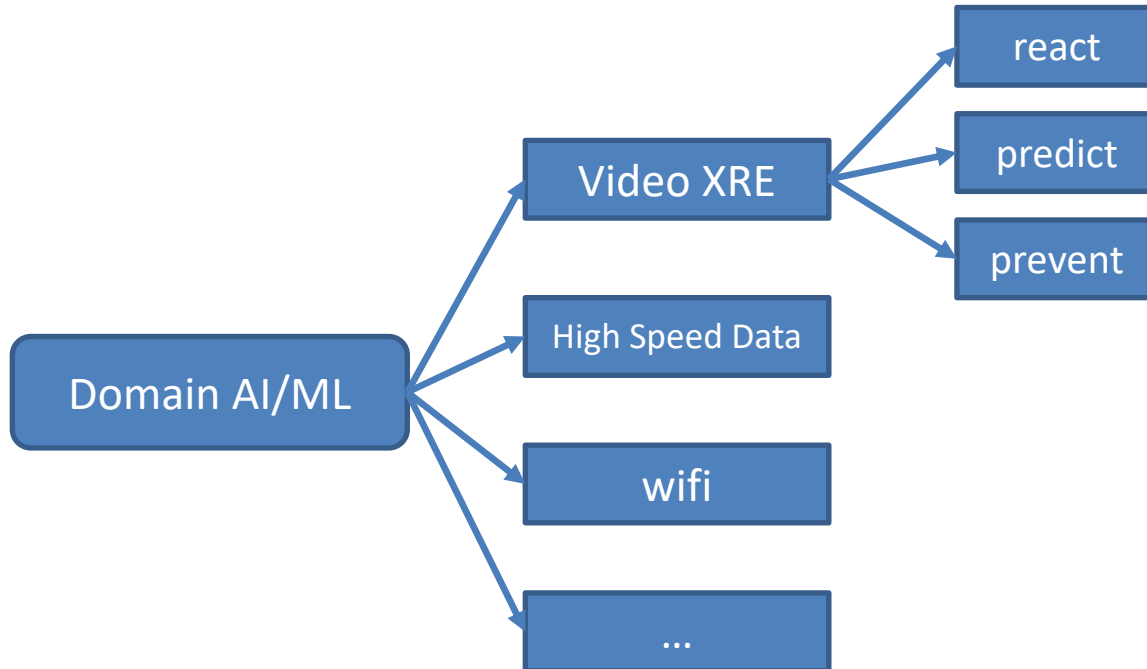


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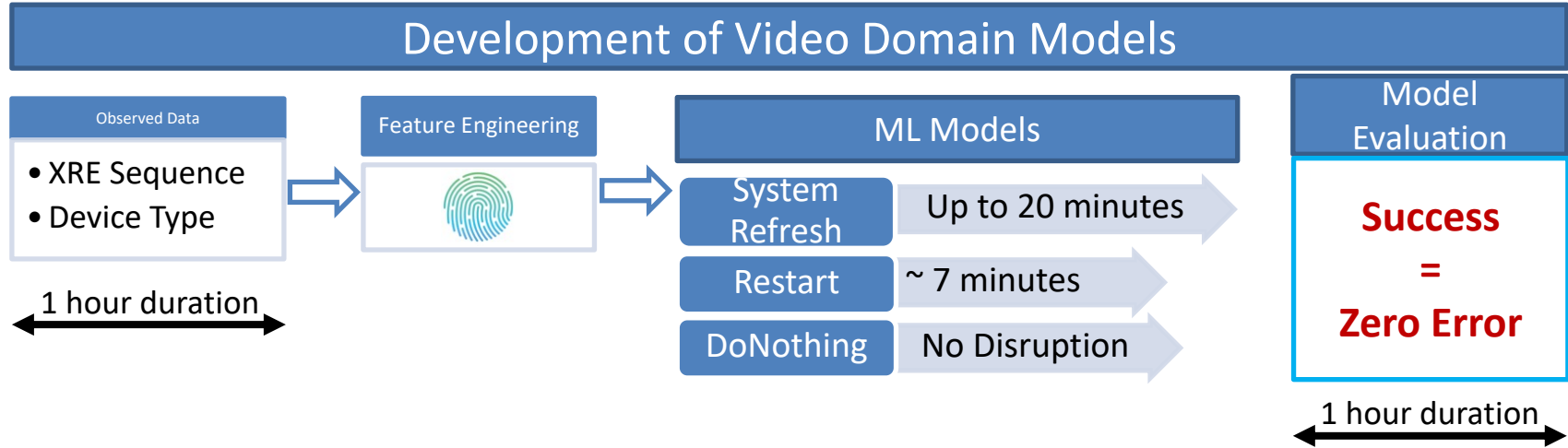


What do we do after an XRE Error?

Who needs our help right now?

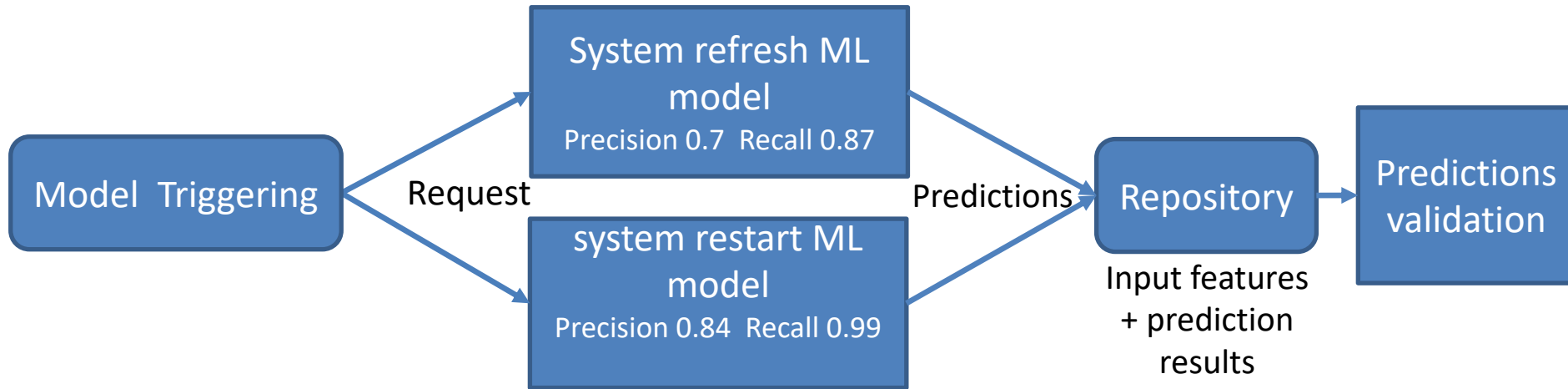
Can we solve issues before they surface?

Identifying Solutions to X1 Errors



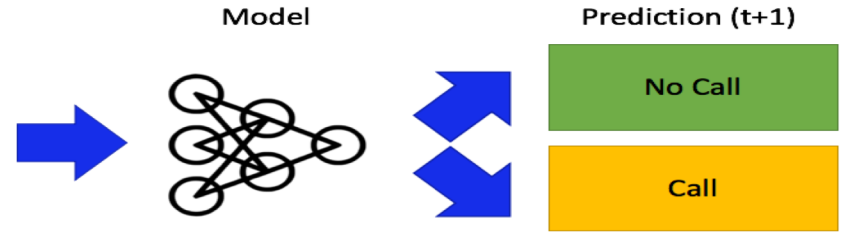
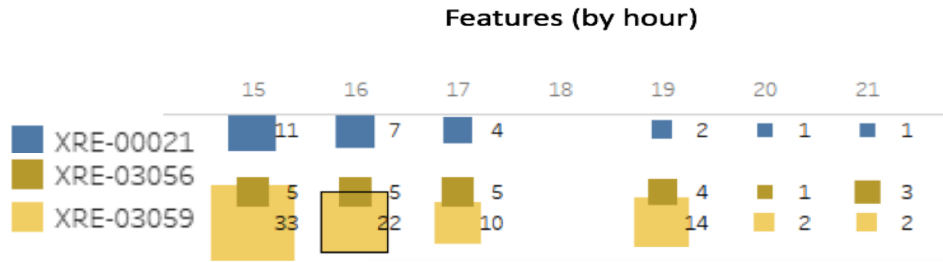
- Considered top 30 XRE errors representing ~94% of all error occurrences
- Machine Learning Predicts **success** of system refresh, restart or natural attrition of XRE errors

Model Deployment



- **System Refresh & Restart models** are deployed in production

Call Predictions: Model Flow

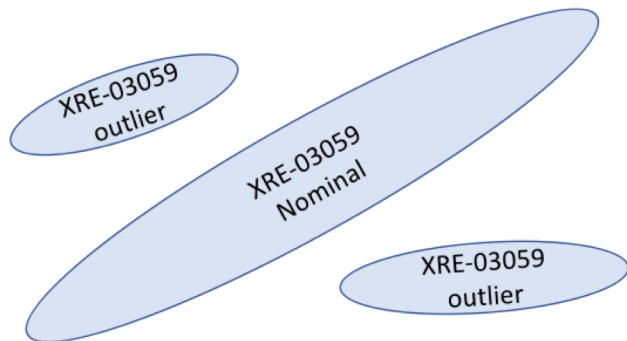


ML Model predicts 64% of calls that happened

	No Call	Call	
Predict No Call	86%	5%	91%
Predict Call	<1%	9%	9%
	86%	14%	

Identifying Silent Sufferers

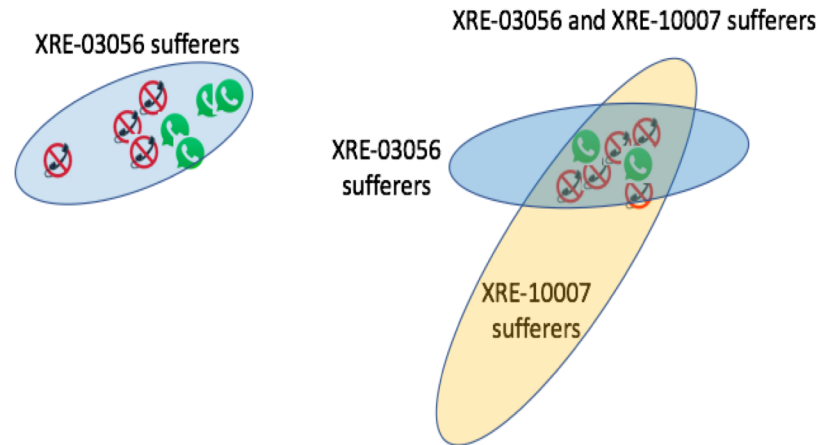
No call => ~~Everything is fine, high NPS~~ => Unsupervised Learning



Experimentally

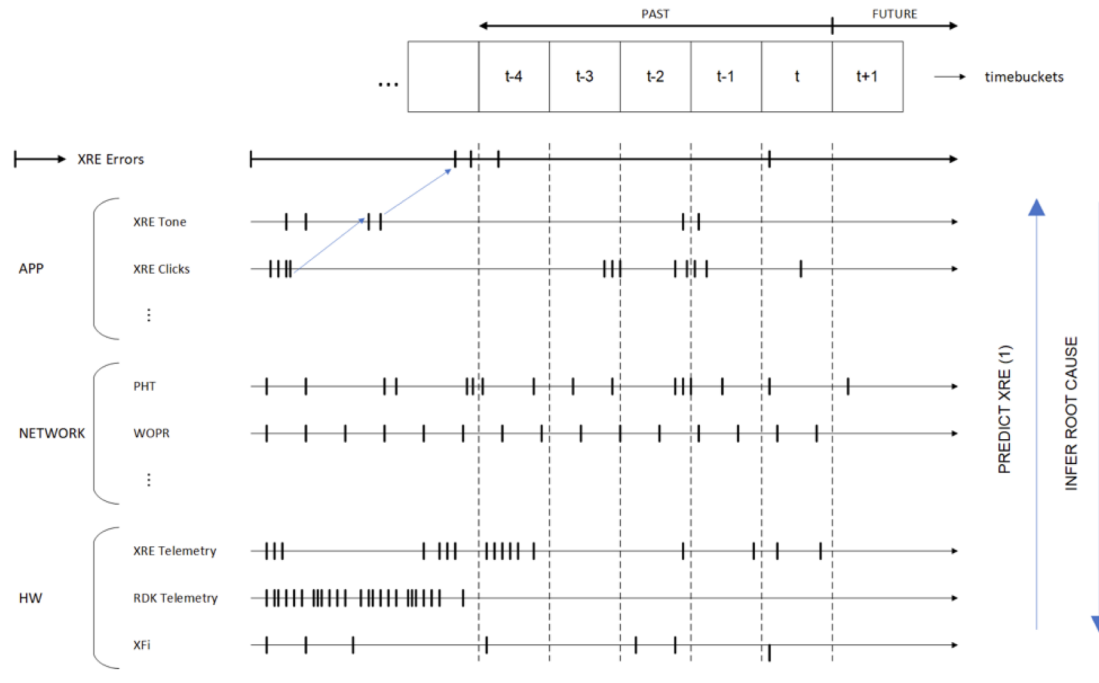
The main class capturing > 90% of **nominal users**.

Outlier are either **nominal** or **sufferers**

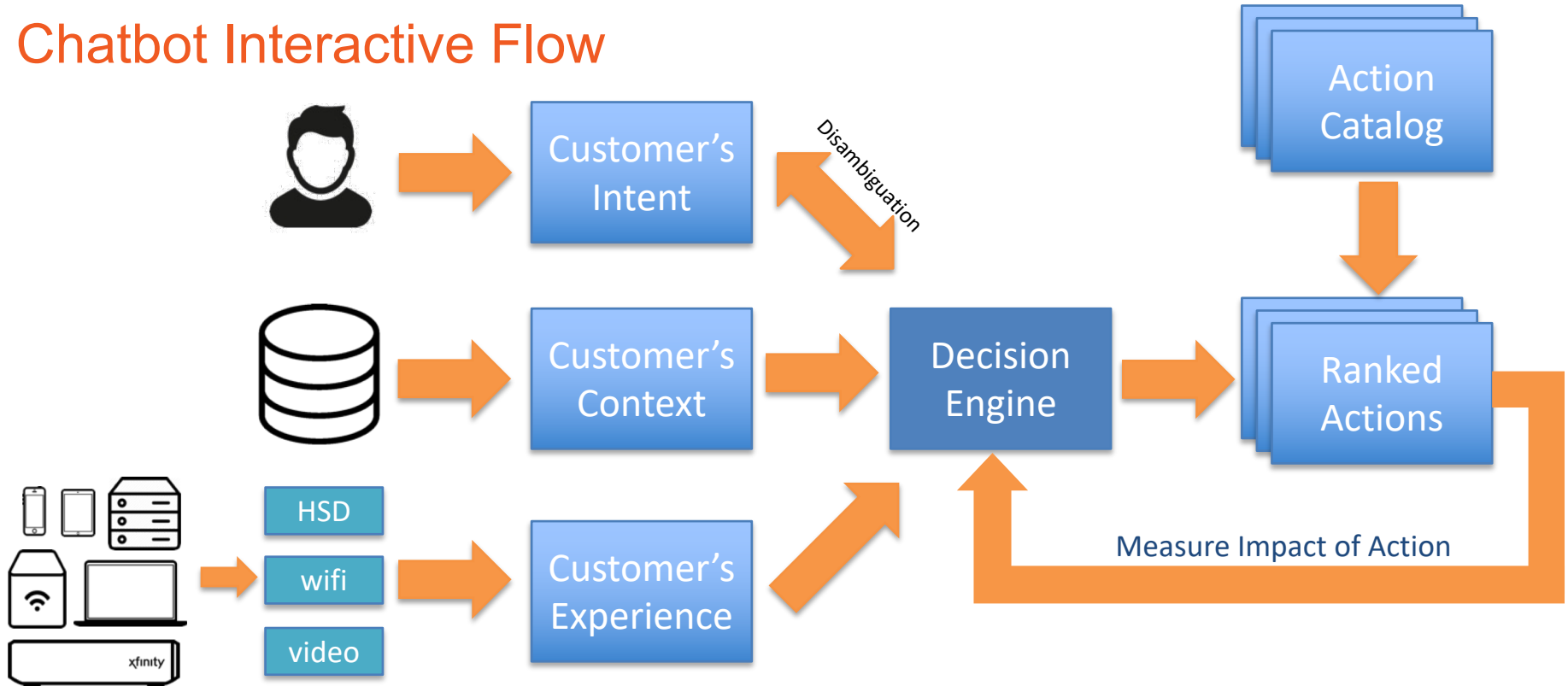


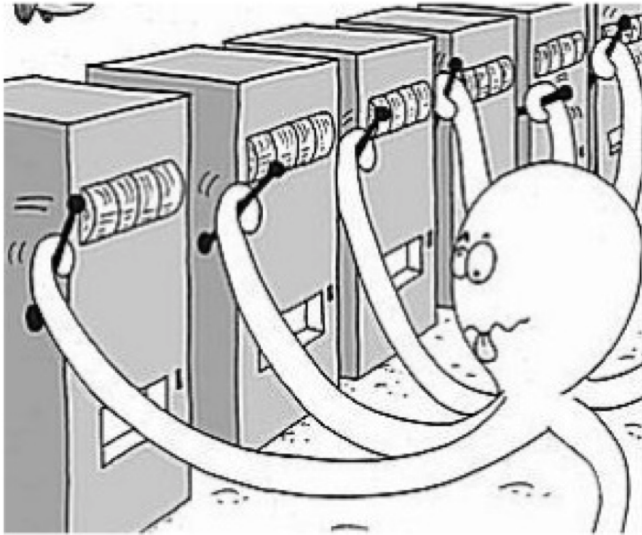
Algorithm uses the knowledge provided by the vocal users to learn knowledge on the silent sufferers.

Root Cause Analysis



Chatbot Interactive Flow





source: Microsoft Research

Caption: Remove if not needed

Multi-Armed Bandit Algorithm

Name references a gambler (generally, a bandit) at a casino

- He (or she) is trying to play the right slot machines in with their many arms to optimize their winnings

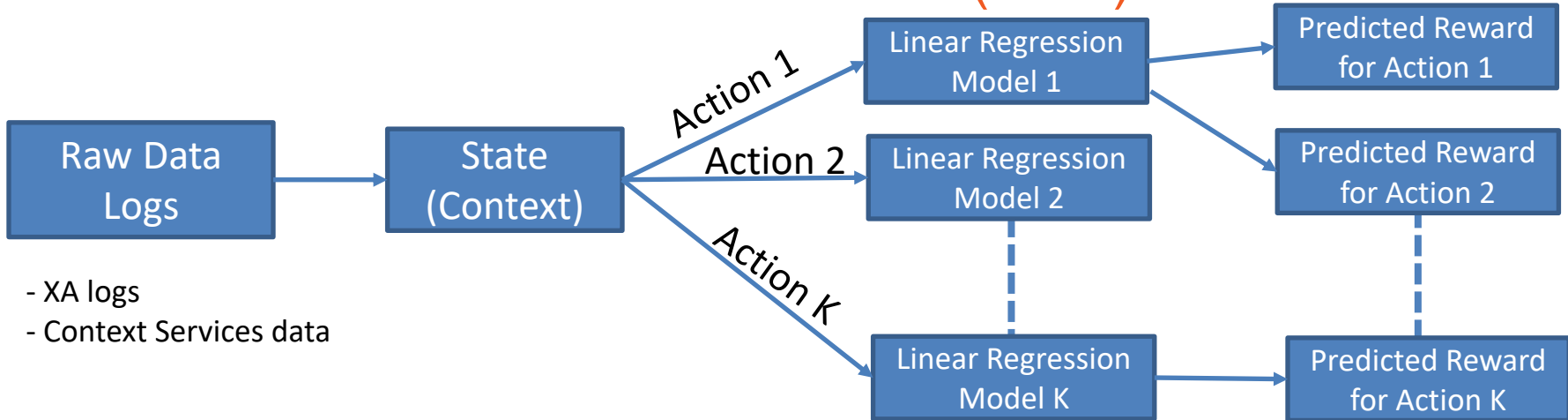
Exploration/exploitation tradeoff is a defining characteristic

- **Exploitation:** play the machine believed to have the highest payout
- **Exploration:** play untested machines to learn if there are higher-paying ones

The best long-term strategy may involve short-term sacrifices

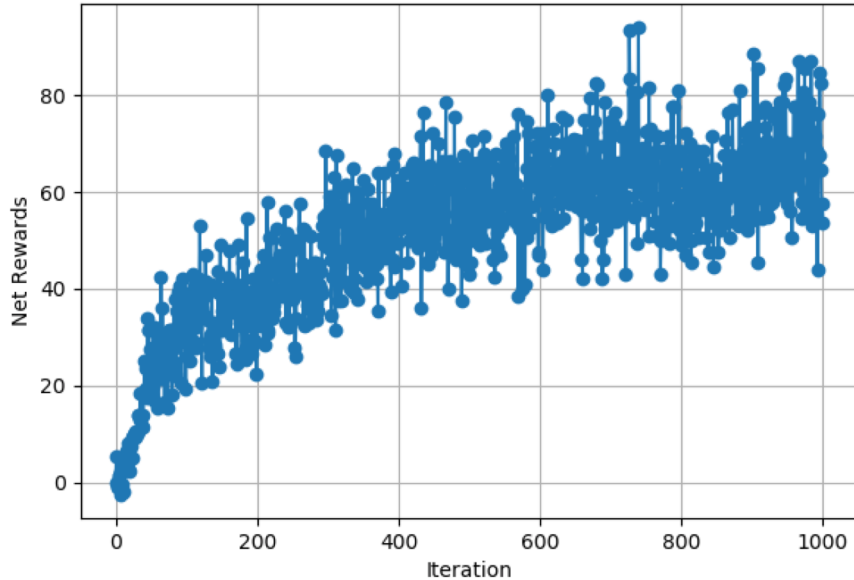
Widely used for single-step decision making problems

Linear Contextual Multi-Armed Bandit (MAB)



$$\hat{R}_k = l_k(s, a)$$

- Training:** The linear MAB iteratively trains several models that map state features to reward via linear regression.
 - With the data sample comprising action k, only the action model k is trained.
- Testing:** During inference, the bandit picks the actions (arms) that provide the highest predicted reward.



Most Recent Results on Policy Evaluation

- When the action chosen by the bandit algorithm matches the action chosen by the user historically, we use that reward.
- Otherwise, that event is ignored.

Each iteration corresponds to 2500 data samples

The AI/ML building blocks presented are currently being tested in production, results are encouraging it is just a matter of time to productize the chatbot.

Our current AI/ML methods are barely scratching the surface of the possible, using classic supervised learning to perform diagnostic, prediction and root cause analysis

AI/ML might open new frontiers in the operational transformations of the cable telecommunication industry by:

- addressing new issues invisible to the human eye
- processing data streams far beyond human capabilities
- developing unsupervised and reinforcement learning

Thank You!

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