Machine Learning for Request Management

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Roadmap

1. What is machine learning?

2. Common uses of machine learning.

3. How can machine learning be used for internal support?

4. How does Spoke use machine learning?

5. Closing thoughts

Machine Learning (ML)

1. ML is the science of creating intelligent systems that learn from data
2. ML teaches computers to **identify key patterns in the data without explicitly programming** them
   a. E.g. for spam detection, you can either encode rules like `if email contains viagara, or v1agara, or nigerian prince…` ' or you can just give examples of spam and non-spam emails and use ML
3. The **strength of ML lies in generalization** from data it has seen to new data
4. Most common usage of machine learning includes system with examples containing well-defined input and output (supervised learning)
   a. Spam detection, ad-click prediction, object recognition in images

Machine Learning: Clarifying Terminology

1. Artificial Intelligence (AI): machines exhibit human-level/style intelligence

2. Narrow AI: intelligence in a narrow domain like identifying human speech

    a. This is where all current systems are at

3. ML is just a technique for implementing narrow AI

4. ***Deep learning***: technique for implementing ML systems using Neural Nets

Machine Learning/AI: common use cases

1. Speech recognition: Google Home, Alexa, Siri

2. Object/face recognition: Facebook, Google photos, Snapchat

3. Language translation: Google translate supports > 80 language pairs

4. [Nice overview slides](#)

Internal Request Management

1. People in an organization make requests from multiple teams
   a. **IT - *"My laptop screen keeps freezing. How do I fix it?"***
   b. HR - *"What's the last date to sign up for benefits this year?"*
   c. Legal - *"Where is the latest NDA?"*
   d. Engineering - *"How do I setup python virtual environment on my office desktop?"*
   e. Sales - *"Where are the sales target slides for Q3?"*
   f. Events - *"Where should I order cakes for a birthday?"*

2. **Machine learning can be used for deflecting and streamlining management of these requests at the point of entry, in the workflow, and for providing high level insights**

ML for IT Service Management

1. **Knowledge Management**
    a. **Automatically handle requests like "connecting to VPN in NYC office", "what is our policy of installing latest MAC OS updates"**
2. **Automatic Routing**
    a. **Routing requests to the right team/person based on the content of the request**
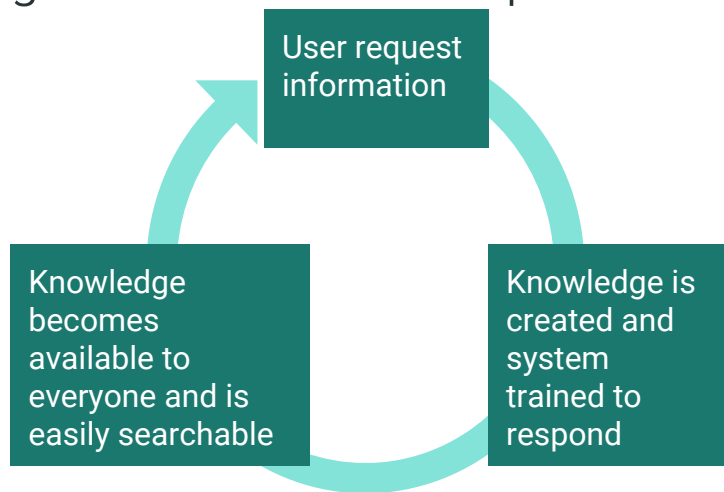3. Classifying attributes of request
    a. Service vs incident, priority,
4. Automatically handle low tier/level 1 requests
    a. Chatbots for supporting common workflows like password reset, software access
5. ML for providing insights

ML for Knowledge Management

1. Knowledge management is the process of creating, serving, and maintaining internal knowledge in an organization
2. Creating knowledge in wikis is tedious, hard to maintain, and difficult to search
3. Converting tickets into knowledge requests and creating knowledge : virtuous cycle for knowledge creation and search powered by ML

Spoke Knowledge Search and Creation Demo

ML for Knowledge Creation

ML for Knowledge Management: Contd

1. ML + Natural Language Processing can be used for responding with the right knowledge base for user questions
   a. Can deflect 20-70% of the questions depending on the use case.
   b. Combining search with ML ensure the system keeps getting better
2. Natural next step: automatically populate the knowledge base of your organization from conversations over email, chat, ticket dumps
   a. Unlock the tribal knowledge
3. User feedback can also be used to automatically detect when some knowledge has become outdated

ML for Automatic Routing

1. Route requests to the right team and people without the user specification
   a.   *wifi connectivity* to **networking**,
   b.   *new laptop request* to **hardware**,
   c.   *database migratio*n to ***eng-support***,
   d.   *paycheck info* to ***hr/finance***.
   e.   **Routing requests to the right users/experts**
2. Learn from past interactions: all the past requests and who resolved them becomes training data
3. Saves time in ticket triaging and provides delightful user experience

Spoke Team Routing Demo
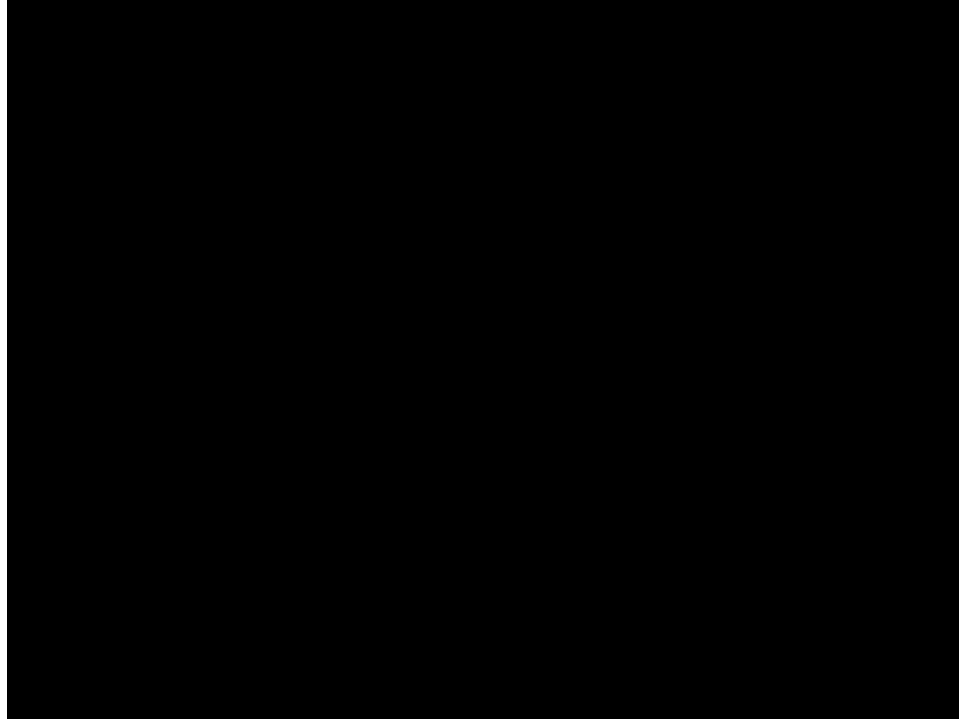
ML for Handling Tier 1 Requests

1. ML for creating a chatbot that can have basic dialogue for request resolution and self-service
   a. Challenge: maintaining context and understanding human language in the context
2. Many startups in the space of automation of basic workflows
   a. Automating password reset flows
   b. Basic troubleshooting and appropriate escalation
   c. More data intensive and longer sales cycle: need access to large amount of data logs and service logs for customization
   d. Automate backend processes
3. Deflect a large number of basic requests saving a lot of time

Predict Request Attributes

1. Predict urgency of request based on the content, requester, etc.

   a. Use user sentiment and key phrases for predicting urgency

2. Suggest solutions to the agent working on the incident/request

   a. Work with the agent present right information needed by the agent

3. Predict potential causes incidents

   a. Analyze past incidents to predict potential causes or point to similar incidents

ML for Providing New Insights

1. Trends and epidemics

2. Knowledge asks

3. Morale/sentiment

4. Identify experts

5. Identify areas to focus on

ML for IT: replacing or augmenting?

1. AI is far from being able to replace a skilled individual

2. Current ML is purely an intelligence augmentation (IA) tool

3. Improve productivity of key functions in an org by handling repetitive tasks

4. Enable insights that were impossible to provide before

5. At the end of the day, makes every employee more productive by reducing friction

ML: Pitfalls and Anti-Patterns

1. Overfitting to specific examples and biases in training data

2. Creates unintended feedback loops

3. Hidden deployment costs

   a. Model development is only 10% of the work

   b. Data cleaning and serving infrastructure is bulk of the work with ongoing costs

4. Quality Assurance: Monitoring is challenging: failure cases are often probabilistic!

5. User experience: users can end up more confused (worst case offended!) when ML fails

New Age of ML Democratization

1. Lots of libraries: Tensorflow, Pytorch, Scikit-learn, Xgboost, etc
2. Platforms for training ML code and serving ML-based predictions: Google cloud ML, Amazon ML, Azure ML, etc.
3. Increasing culture of code sharing and collaboration
4. Multiple courses on offer by universities, private companies, education companies
5. The future of ML and ML for IT is exciting!

Thank you!