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Point of View

MLOps: How to Stay Relevant with your AI/ML Approach

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Introduction

The adoption level of DevOps across industries started to see a bloom when faster and swift software development became a necessity.

Similarly, some companies which are data and ML Model heavy required an additional layer on top of DevOps to manage the ML Lifecycle which is later known as MLOps(Machine Learning Operations).

Deeplearning.ai stated that "only 22 percent of companies using machine learning have successfully deployed a model" which supports the need for MLOps.

Taking the growth of ML market , spending efforts on MLOps can reap long-term value for deployed ML Solutions.

MLOps – Without MLOps

Let's see two companies' journey from their beginning using MLOps and without using MLOps.

Company A is an e-commerce company that builds ML products and solves real-time issues for customers such as search result optimization, product recommendation based on interests, etc.

Prediction results are so accurate that the company has many customers with a good user experience. The setup around these models is pretty simple and only versioning, execution history (logs), and some metrics are captured which have inconsistent monitoring.

But due to the good performance, the company cuts the cost of spending additionally for the ML lifecycle.

Meanwhile, Company B has complex problems to solve and has less accurate solutions.

But it has the MLOps framework set up in a very good manner which handles versioning, execution history, logging, and detects outliers, cardinality, and seasonal trends. It creates a proper data pipeline to capture configuration parameters, evolving data, etc.

In five years, when there is a situation like covid or other economical disruptions happening, the customer behavior totally changes, which in turn, produces a lot of evolution in terms of data.

Company B has been slowly getting in line with the changes happening, but Company A has a lot of model-based issues that impact the whole business of that company.

The main reason behind company B's success is that it surpassed most of the adoption challenges with respect to MLOps that Company A failed to pass.

Key Takeaways

- MLOps helps companies to stay ahead of advanced problems and discrepancies at a data level.

- This way the accuracy of solutions remain intact.

Adoption challenges and solutions

Challenges that any company might face during the MLOps integrations are:

1. Time to Introduce the Framework

Implementing the framework at the right time will be a challenge for leaders as it demands adhering/understanding the vision of their organization properly.

Solution

Leaders should analyze the future opportunities, scope, and prospects of ML products and introduce MLOps before the size and the scale of activities around the ML models get huge. This will reduce the chances of integration failures.

2. Deciding whether it's needed

To decide on the necessity of a layer of technology on top of another stack is a crucial decision as it involves efforts and cost separately.

Solution

It depends on the organization's vision of having a futuristic mindset by clearly outlining the various ML products in the pipeline and their outcomes. Having knowledge about factors that will impact the business is also key to adopting this framework. Companies that have products that are not so ML embedded can refuse this approach as it might be an overkill in terms of cost.

3. Dynamic change management

While using a variety of tools it'll be difficult to find the best combination and integrate it into the framework for performing functionalities.

Solution

Stakeholders and various deciding authorities should be consistently updated with upcoming tech stacks to configure the framework on a continuous basis with respect to dynamic customer behavior and changes. A clear sunset plan of all tools related to the model should be outlined to manage change impacts.

4. Knowledge Gap

Even with the presence of tools, and technology if the resources are unable to extract the potential benefits from them due to a lack of skill or applied knowledge the whole MLOps setup may fail.

Solution

The lack of key skills for SMEs and KDM's can be addressed with continuous training, technical resource provisioning to experiment, and

employing dedicated people for MLOps. Courses/Certifications can be introduced to bridge the gap in technical understanding.

5. Choosing implementation Type

According to the respective landscape of an organization, the typical deployment type should be selected. If not, it may lead to integration problems.

Solution

MLOps can be implemented in either serverless/cloud with managed platforms or in-house platform implementation. An organization must decide the type by taking into the implementation constraints. Reports say, third-party tools provide low cost in terms of the infrastructure spending, low data scientist efforts and models are deployed faster.

6. Tooling Complexity

Even with perfect implementation, it'll be little difficult to assess the future issues with respect to changes.

Solution

To address tooling complexity and adherence to a particular environment a Pilot phase of the framework can be introduced and tested for a period of time. This reduces the cost and allows to experiment with different combinations of tools or landscapes. Hybrid Infra can be dealt with MLOps tools having good interoperable, scalable features.

Success stories

Let's see some real companies that have implemented MLOps in their environment and reaped benefits.

1. Uber (Transportation company)

Uber had the necessity to empower a better customer experience, help prevent safety incidents, and ensure market efficiency, all in real-time
They saw a significant increase in ML model adoption across the organization which made them think about MLOps.

Key Challenges that Uber faced with regards to ML :

- To support a large amount of ML models deployment daily as they grew rapidly.

- Maintain memory footprint associated with Real-time prediction service.

- To bring different model rollout strategies.

To solve these ML Operations challenges they came up with a CI/CD Storyline after many iterations where they built a 'Model Deployment Service' that comprises deployment workflows, retirement workflows, Auto-retire, and Model status Update workflow.

The benefit 'Michelangelo' (MLOps framework) brings to Uber is that it solves operational challenges and helps at every ML lifecycle process.

2. Booking.com (E-commerce company)

This company had the necessity to use a diverse set of toolset to cater diverse model types and behaviors. This diversity in turn was a huge challenge to the organization.

Key Challenges Booking.com faced in terms of ML

- Consistency in prediction
- High Availability
- Low latency
- Scalability

Benefit
Booking.com came up with their own MLOps tool called "RS" which mainly decouples training from prediction. So it creates an interface where the model experimenting and monitoring efforts are totally abstracted.

3. Philips (Consumer Electronics company)

Philips faced a challenge in measuring the efficiency in the product development.

Key challenges faced in terms of ML

- Inconsistency in maintaining documentations.
- Lack of visualization to bring powerful insights.

Benefit
Philips solved these challenges using "ClearML" which improved the efficiency in major areas with automatically capturing metrics and parameters.

Conclusion

It's important for companies that rely on AI/ML services to have a proper ML Operations setup to manage variable complexities that arise in the course of data evolution, where a lot of patterns and configurations will undergo change to stay relevant with the predictions. It's imperative to automate these changes into the system by having custom or external MLOps frameworks integrated.

About the Author

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Working as a solution architect with 2 years of experience in the field of AIOps solutions. Also a full-stack developer mainly in the Django and LAMP Stacks. A proactive and process-oriented person interested in researching the AI/ML Field and playing as an SME for technologies like ServiceNow.

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