Deep Learning for Ancillary Pricing

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“Deep Learning is here. Own what happens next.”

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01 Research Objectives

02 Ancillary Pricing Use Case

03 Key Learnings and Next Steps

04 Our broader vision

FROM AVERAGE TO **INDIVIDUAL** DECISIONS

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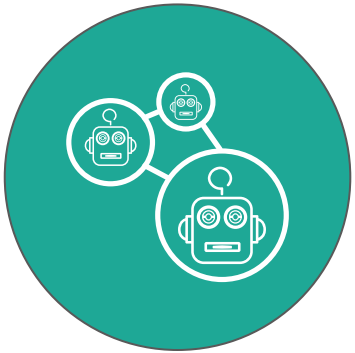
Research Objective

Can deep learning make better predictions at an Individual level

Can those predictions be converted to better Individual decisions



What happens when many AI agents make decisions in the same environment

ILLINOIS

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Ancillary Pricing

Ancillaries complement RM and are perfect to measure the revenue opportunity of moving from “Average to Individual”

- Complementary to Right-to-fly
- Not Optimized at Most Airlines
- Deeply Personal and Attribute Driven Sale
- Ancillaries Compete for Wallet Share and Shelf-Space
- Influenced by Price and Placement (start with price)

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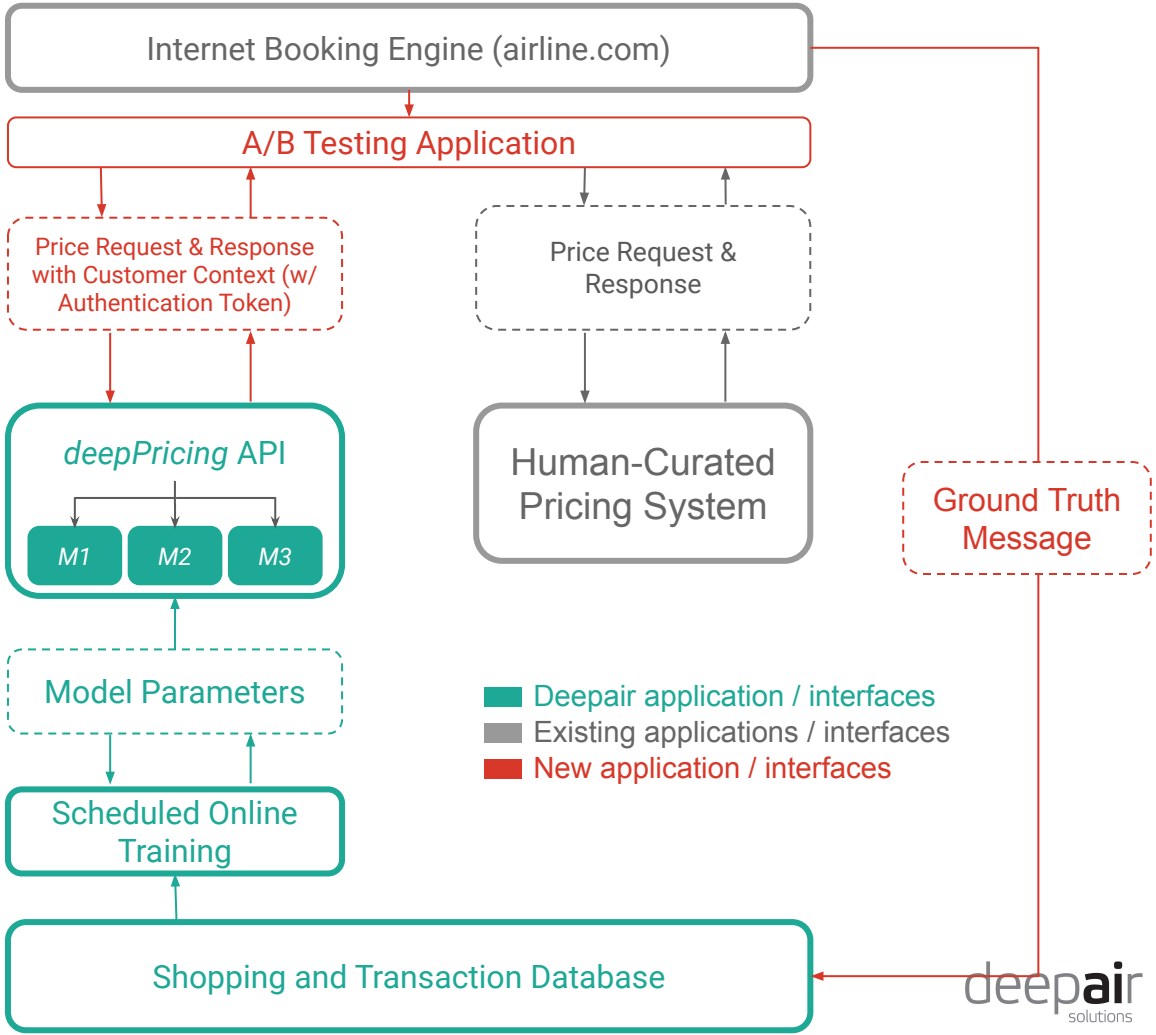
High Level Set-up

Built an ML experimentation platform from the ground up



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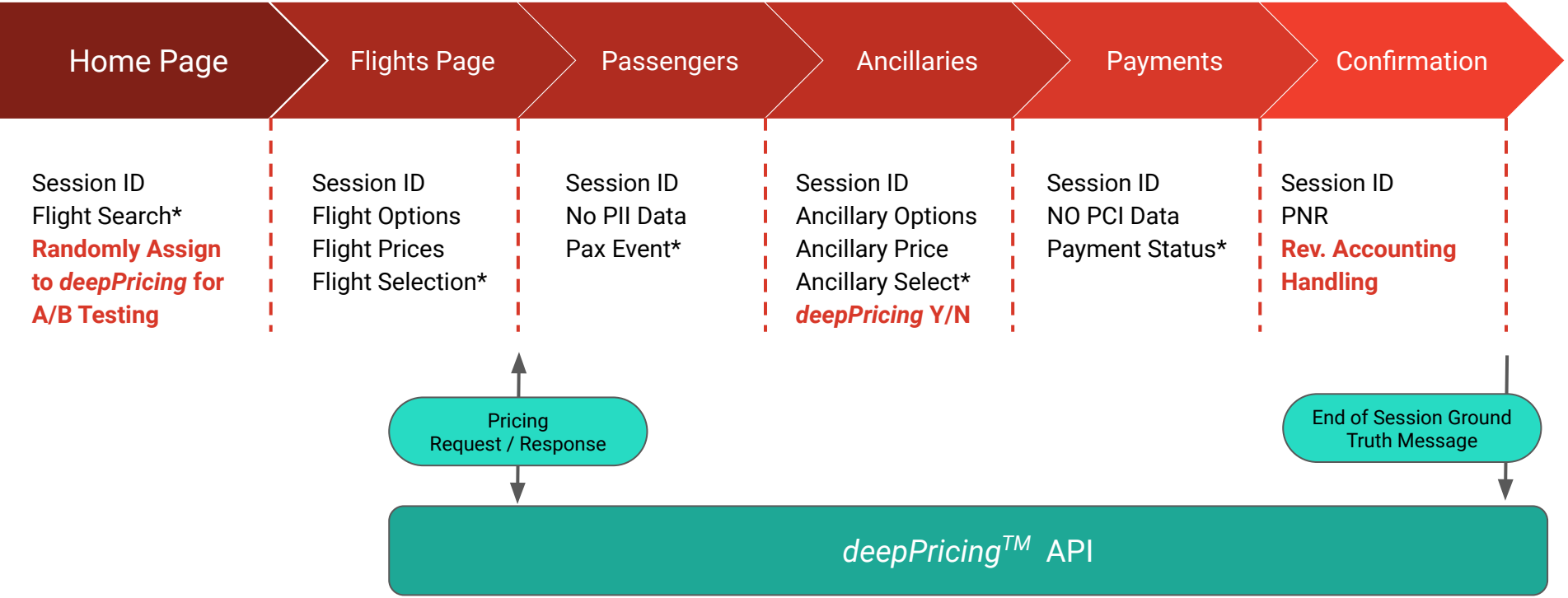
Functional View on airline.com



* represents the event that triggers transition to next step in the booking process

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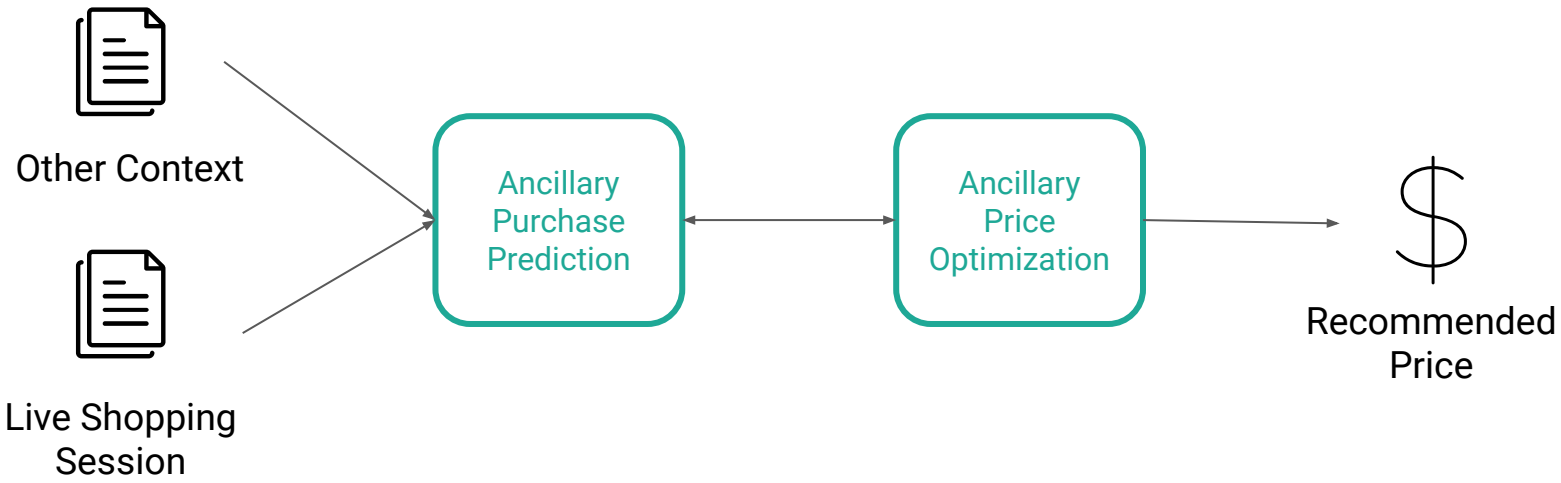
A Two-Stage Dynamic Pricing Model



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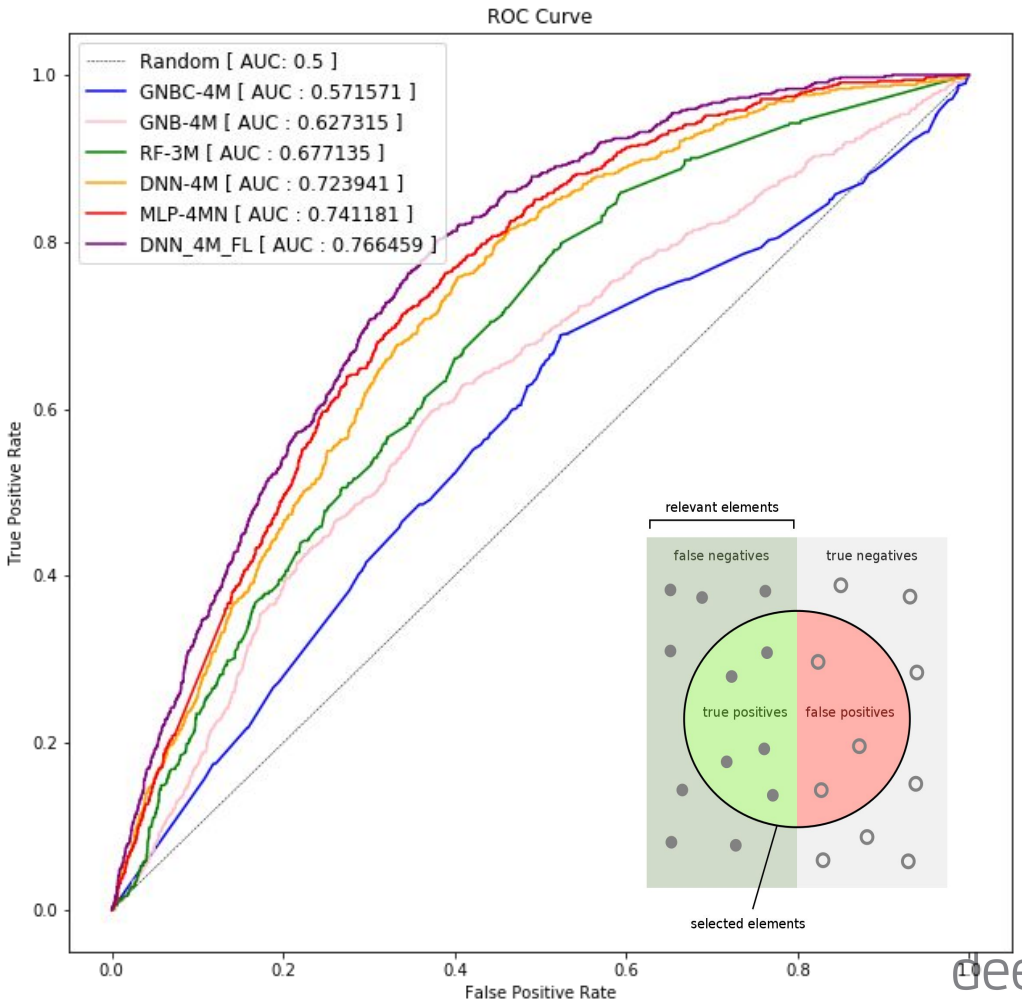
Ancillary Purchase Prediction

Deep Neural Network beats traditional models



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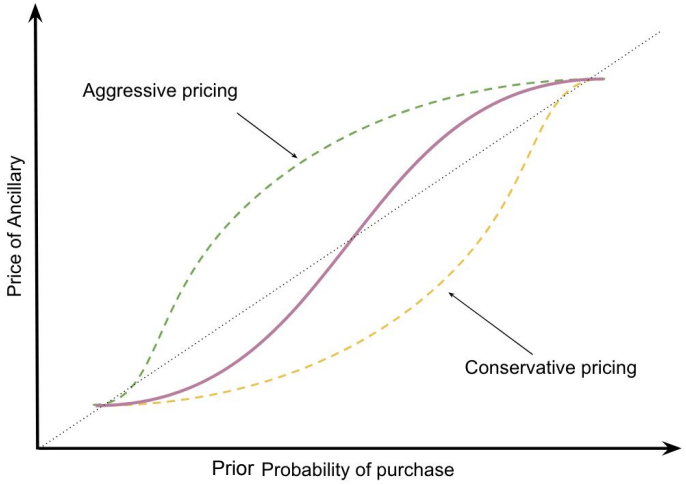
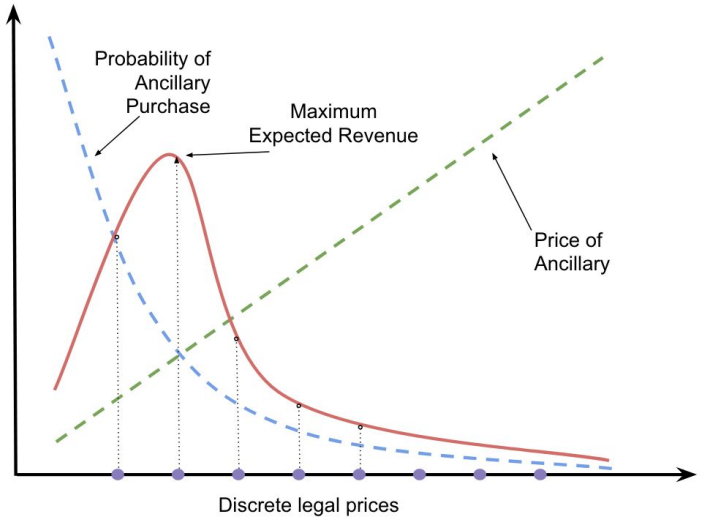
Ancillary Price Optimization

Logistic Pricing



Discrete Exhaustive Search



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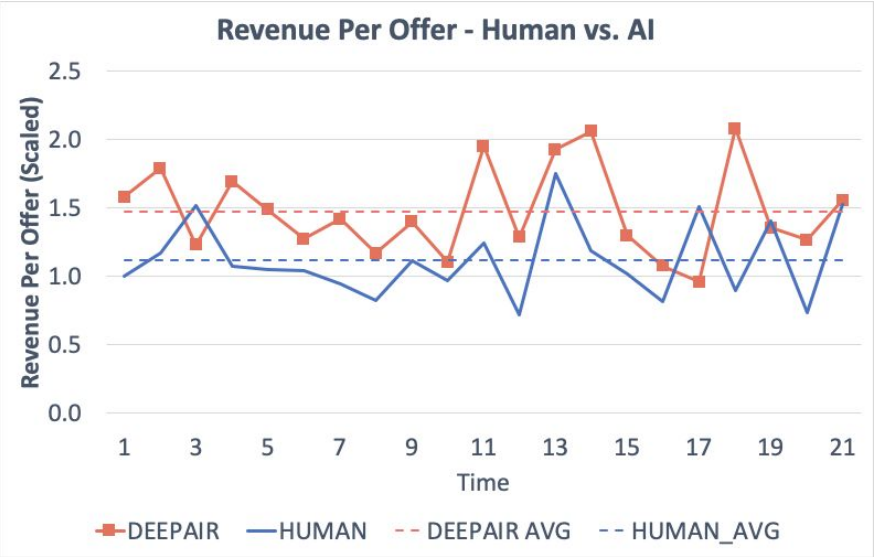
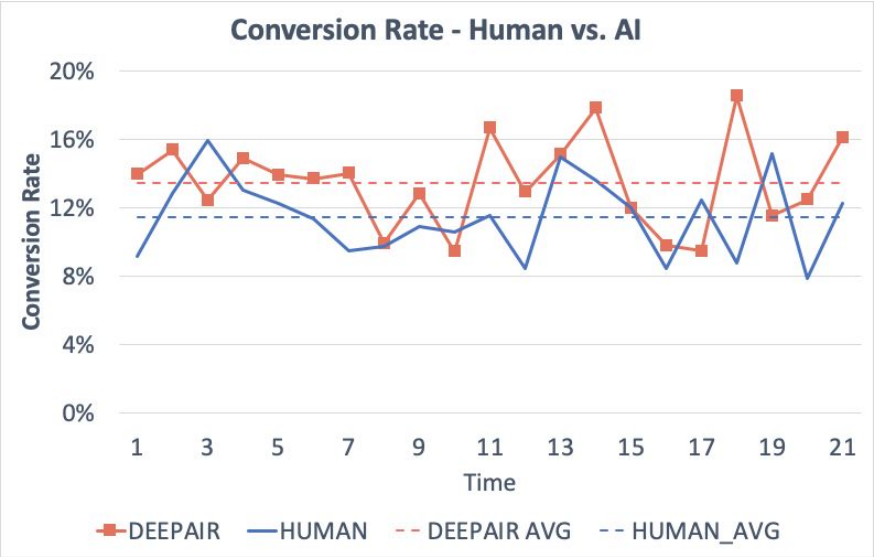
Human vs. AI Performance

Summary: AI driven pricing resulted in 25% incremental Revenue Per Offer (p-value 0.000297) and 17% higher Conversion compared to Human, just with a discounting strategy.





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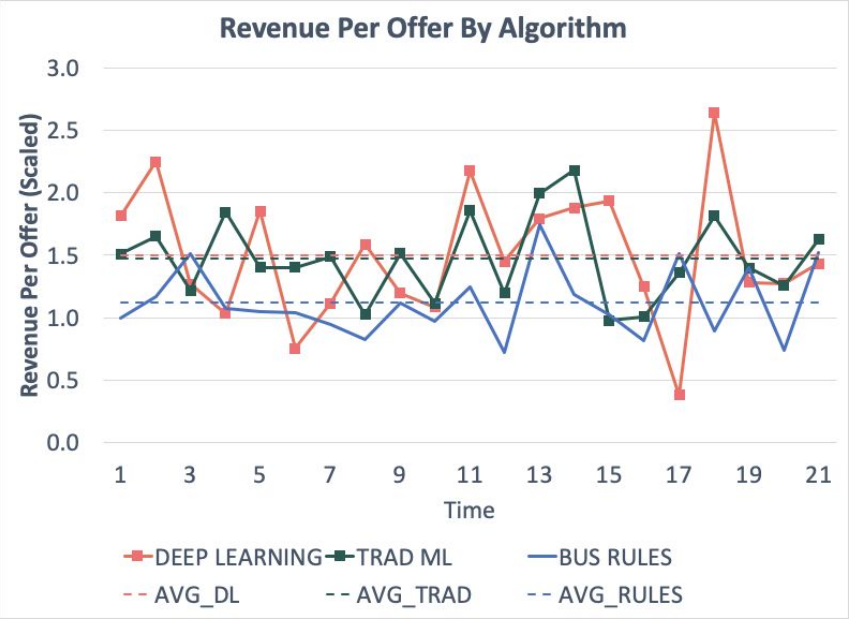
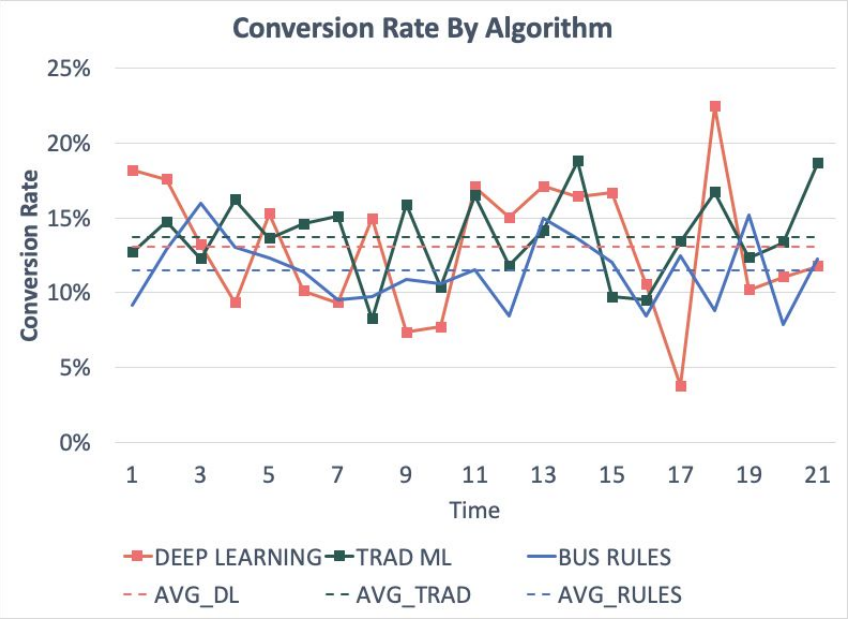
Algorithm Level Performance

Summary: Although deep learning is 35% more accurate in predicting the probability of purchase compared to Traditional ML, this isn't resulting in proportionally better online performance.





Traditional vs. Rules (p-value): 0.000376; Deep Learning vs. Rules (p-value): 0.00360

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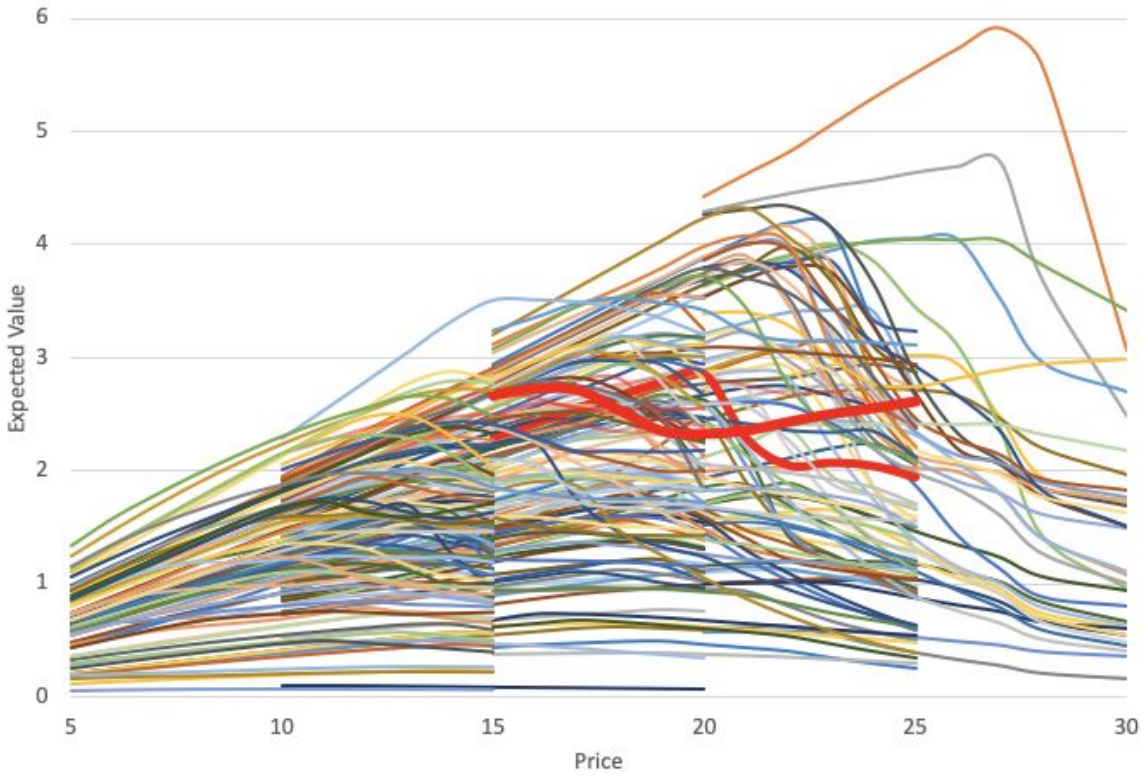
Price Sensitivity

Neural Network did not learn the monotonic relationship between price and probability



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Next Steps

AI Driven Pricing show revenue potential

- Explicitly “Teach” the Neural Network Price-Demand Relationship
- Single Stage Optimization To Reduce Error
- Meta Learning AI that explores and exploits various AI algorithms
- More ancillaries and more touch points to research multi-agent environments

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The Big Picture

Delighting travelers at scale by moving from average to individual Decisions

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"In an Experience Economy, businesses will find that the next competitive battleground lies in staging experiences."
- HBR

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Revenue Optimization Redefined

Imagine 100s of services and revenue sources to choose from, to curate a truly individualized experience

Traveller Experience

AI Driven Retailing

- Pricing
- Content Discovery
- Contracts
- Service

CIRRAVIA

Settlement and Distribution Platform

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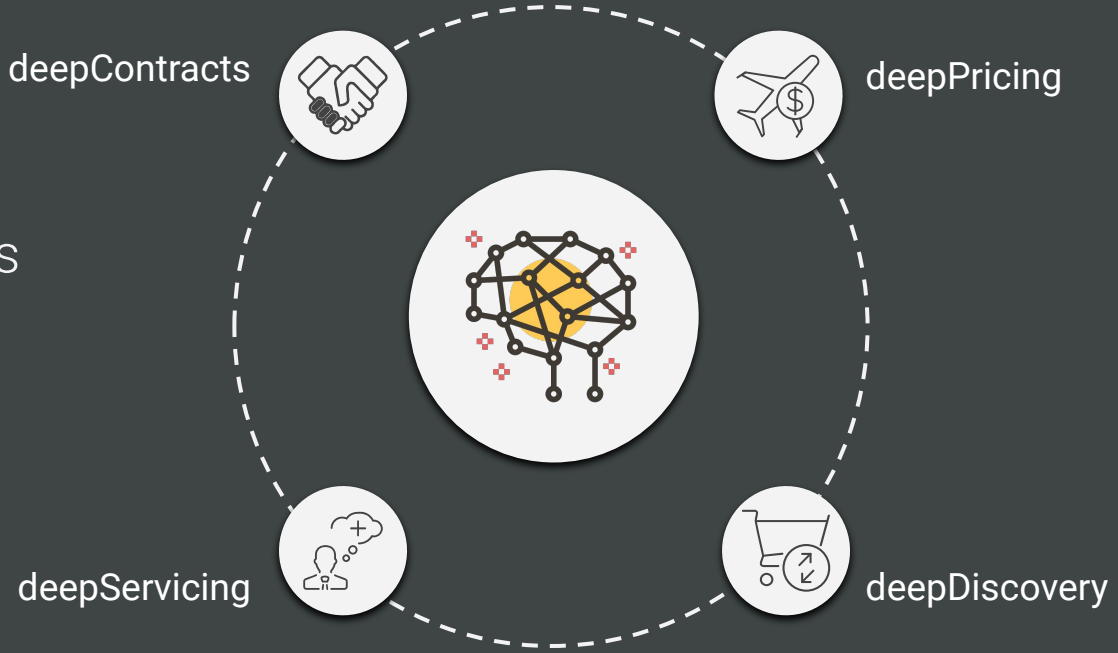
Four Deep Learning Agents Working in Harmony



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