

# AI at the Webscale Project Results

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- Epsilon-greedy
- Gibbs-sampling
- Thompson-sampling

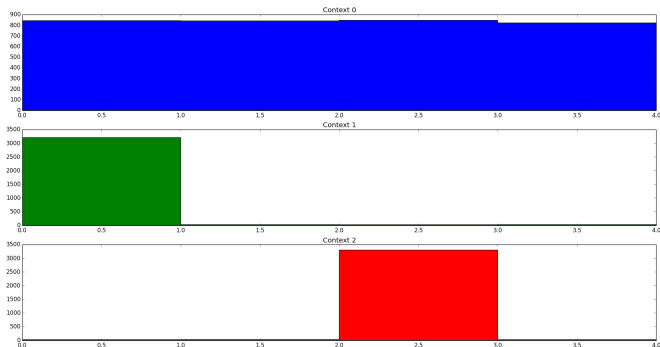


$$r = \beta_0 + \beta_{x_1} c_1 + \dots + \beta_{x_k} c_k + \\ \beta_{y_1} a_1 + \dots + \beta_{y_l} a_l + \\ \beta_{z_1} c_1 a_1 + \dots + \beta_{z_m} c_k a_l$$

- Reward for update: use *price · effect* instead of *effect*

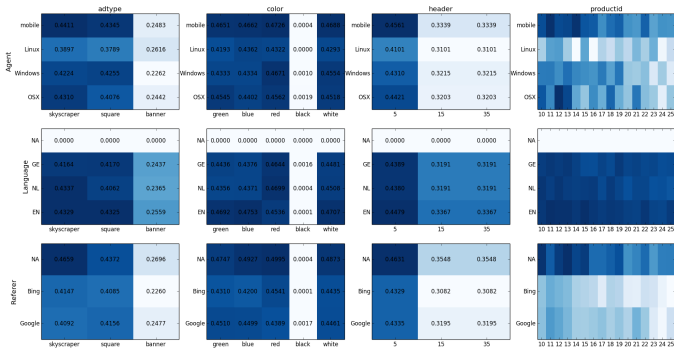


# Visualization of policy



- Pre-defined distribution for 3 context parameters, and 4 arms

# Visualization of context vs. proposal



- Every possible combination of proposal parameters, except *price* = 1

# Miscellaneous improvements

- Price: Maximize polynomial:  $\beta_0 + \beta_1 \cdot p + \beta_2 \cdot p^2$  instead of bucketing: [1, 5, 10, 15, 20, 25, 30, 35, 40, 45, 50]
- Multivariate Gaussian speedup: using Cholesky transformation
- Use 5000 random interactions to give model 'warm start' before doing actual predictions
- Add features for user ID: average price user paid previously, and whether the user actually bought anything

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- Average reward: 16.75
- Standard deviation: 5.07
- Time taken:  $\sim$ 01:25h per run
- Any questions?

