## Select <br> Riffled Independence for Ranked Data <br> Jonathan Huang, Carlos Guestrin



Full Independence on Rankings


Riffled Independence


Other Notions of Independence

| Fruits, Veggies fully independent | Fruits, Veggies riffile independent |
| :---: | :---: |
|  | Easylos ofonditios |
|  | Easy to condition |
|  |  |
| Harder to condition | Harder to conditio |
| Easy to condition on any observations involving only | $\begin{aligned} & \text { Easy to condition on observat } \\ & \text { involving relative rankings of } \end{aligned}$ |



Can we exploit riffled independence in bandlimited Fourier settings?

Fourier Theoretic Algorithms

(Riffle Join problem) Find Fourier coefficients of the
joint $n$ given Fourier coefficients of factors $f t g$, and $m$ ? (Rifflesplit problem) Find Fourier coefficients of
factors $f$ fand $g$ given Fourier cofficients of the joint $t$ ?

- Solution: can write both algorithms using
convolutions, joins and splits:
 $\begin{aligned} & \text { maepencent } \\ & h(\sigma)=m(\tau)\end{aligned} * \underbrace{\left(f\left(\sigma_{p}\right) \cdot g\left(\sigma_{q}\right)\right)}$



Take Home
Riffled Independence...
is a natural notion of independence for rankings - is a natural notion of independence for rankings

- can be exploited for efficient inference, low - can be exploited for
sample complexity
- can be integrated seamlessly into Fourier
theoretic inference frameworks - approximately holds in certain real datasets

