Stochastic Covariance Functions for Understanding the Histology and Improving Detection in Solid Tumors

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What, why and how?

• What: Modeling surfaces and spatio-temporal dependence structures.
  • Histology
  • Radiology

• Why: Solid tumors are inherently heterogeneous.

• How: Using hierarchical dictionaries.

McGarry et al. International J. Rad. Onc. Biology Physics, 2018
Covariance functions generation
Surface generation
Issues with the “Ground Truth”

The Effects of Ground Truth Variance on Radio-Pathomic Mapping in Prostate Cancer
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ISM RM 2019, Montreal
Robustness of findings: Knock-offs

• “Ground-truth” can be variable and oracle evaluation may not be feasible.

• Add “knock-off” that resemble existing data

• “Knock-off” metrics mimic actual observed data metrics

• Should help measure false discovery rates, etc ...
Recent Success

• A Restricted Space-Filling Algorithm for Bayesian Learning with a Nearest Neighbor Gaussian Process (BLING)

Tucker K, McGarry SD, Lowman AK, Iczkowski KA, Jacobsohn K, Bukowy JD, Barrington AW, Hohenwalter M, See WA, LaViolette PS, Banerjee A.

In BNP @ NeurIPS [Dec 2018].
Summary and Funding acknowledgements

• Lots to investigate ...

• My favorite quote, by Bill Watterson, C&H, “It’s a magical world, lets go exploring ...”

• Questions?

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