Uncertainty Quantification: Prob, Drop, Det

You

Where You're From

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[Gal and Ghahramani, 2015]'s test-time dropout

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[Gast and Roth, 2018]'s *ProbOut*

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The inverse problem

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Architecture overview

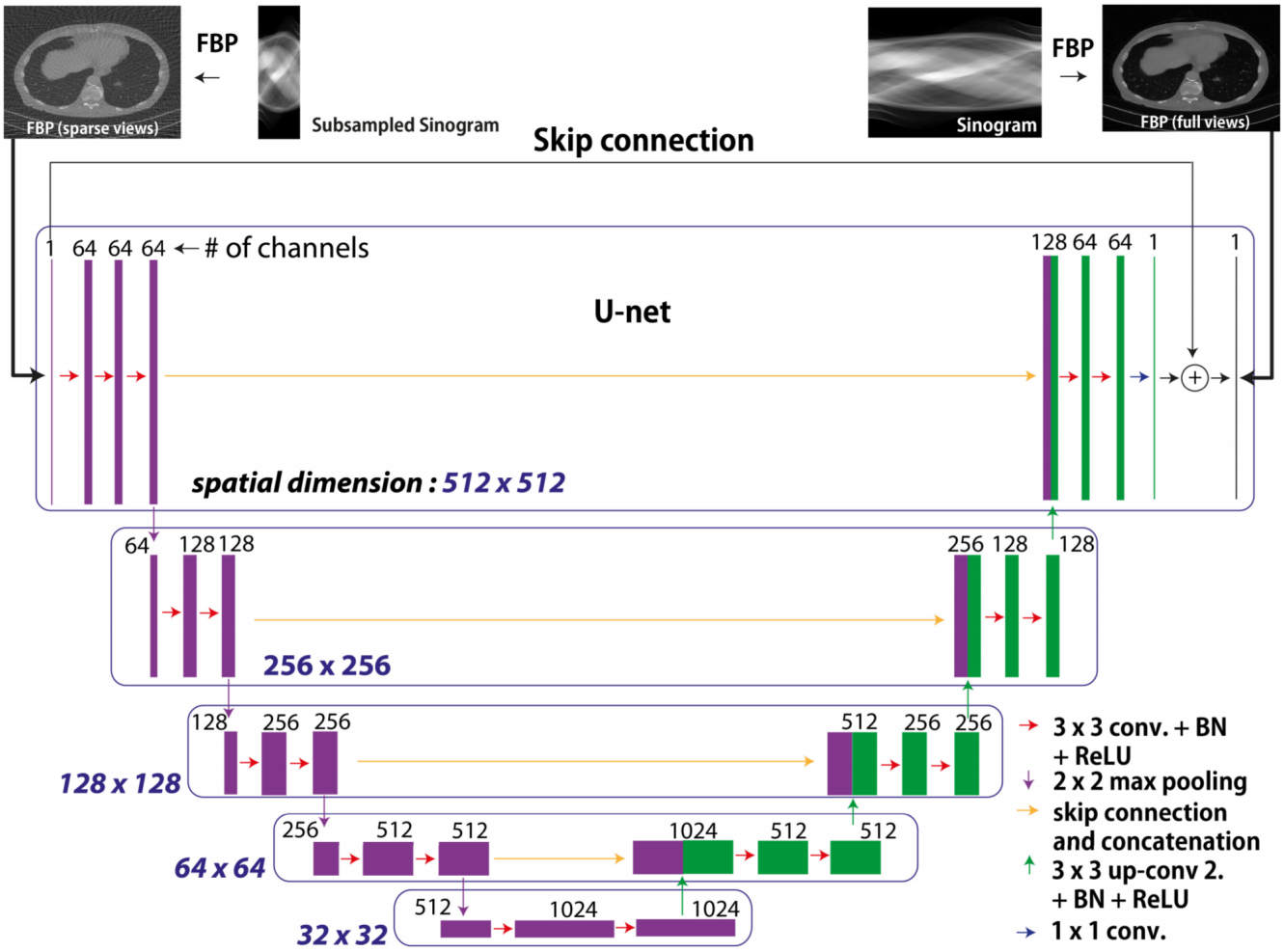

Figure: U-net as adapted by [Jin et al., 2017], graph is by them.

Architecture variants

- **FBPConvNet-Det**: the [Jin et al., 2017] et al model with l2 loss
- **FBPConvNet-Drop**: same as **FBPConvNet-Det**, but dropout is kept on during inference as proposed in [Gal and Ghahramani, 2015]
- **FBPConvNet-Prob**: at the last convolution one more kernel is added so that we get two outputs per datapoint, $\boldsymbol{\mu}$ and $\boldsymbol{\beta}$, and the l2 loss is replaced by the negative conditional log-likelihood of the power exponential distribution with $k = 0.5$

$$-\log p(\mathbf{y}|\boldsymbol{\mu}, \boldsymbol{\beta}) \propto \sum_{d=1}^{D} \log \beta_d + (\sum_{d=1}^{D} \frac{(y_d - \mu_d)^2}{\beta_d})^k$$

Bibliography I


Gal, Y. and Ghahramani, Z. (2015).
Dropout as a Bayesian Approximation: Representing Model Uncertainty in Deep Learning.
arXiv:1506.02142 [cs, stat].
arXiv: 1506.02142.


Gast, J. and Roth, S. (2018).
Lightweight Probabilistic Deep Networks.
arXiv:1805.11327 [cs, stat].
arXiv: 1805.11327.


Jin, K. H., McCann, M. T., Froustey, E., and Unser, M. (2017).
Deep Convolutional Neural Network for Inverse Problems in Imaging.
IEEE Transactions on Image Processing, 26(9):4509–4522.
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