Inverse Crimes

→ ignore or neglect model/data mismatch

real data : given real data y that has been collected/measured/observed in the real world, we choose a model $G(x)$ and try to best fit it to the data

→ no crime here!

synthetic data : using a model G and inputs x, we computationally simulate data $y = G(x)$

→ typically do this first when testing an algorithm (this is good practice!)

→ must add noise to make more realistic

An inverse crime occurs when the same model / computational grid is used to solve the inverse problem that was used to generate the (noiseless/perfect) data

→ may lead to "too-good-to-be-true" reconstructions / "unrealistically optimistic" results

→ misleading conclusions about the feasibility and performance of the method / algorithm in practice

(see example in MATLAB)

NOTE: inverse crimes are <u>not</u> possible when using real-world data

→ issue only in simulation studies using synthetically generated data

How To Avoid

* Use different discretization scheme / computational grid in generating data than in solving inverse problem

* Add a reasonable amount of noise to data

* Consider test for inverse crimes as a part of workflow when designing, implementing, and testing an algorithm!