Information-theory approach to model class assessment for tissue-engineered cultures consistence evolution

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Abstract. An information-theory approach to Bayesian model class assessment is presented in this work for selecting the most plausible model class for soft-tissue-engineered consistence evolution. A set of candidate models based on the theory of Markov chains are proposed to idealize the temporal evolution of basic mechanical properties of an in-vitro tissue culture. Model parameters are first inferred from ultrasonic measurements using a Bayesian inverse problem framework [1]. Then, the posterior information of model parameters is further used to obtain the plausibility of the associated model class. Candidate models are ranked based on their probabilities to reproduce the measurements while avoiding the extremes of over-fitting or under-fitting, that in this work, are expressed from a information-theory perspective. A case study is presented using in-vitro ultrasonic measurements revealing the principle of "Ockham' razor", which in this context can be stated as "simpler models are to be preferred over unnecessarily complicated ones".

Keywords: Engineered tissue, mechanical properties, information theory, Bayesian analysis

References

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