The PhysioNet/Computing in Cardiology Challenge 2010: Mind the Gap

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In settings ranging from sleep studies to surgery to sports medicine to intensive care, real-time monitoring of a variety of physiologic signals has become an essential tool for clinicians and researchers. Transient corruption or loss of one or more signals, common in all of these settings, can be disruptive, especially when continuous observations are required in order to rule out rare events or as a basis for forecasting. Signal corruption can be particularly challenging when it mimics features that are associated with pathologic states.

The aim of this year's challenge is to develop robust methods for filling in gaps in multiparameter physiologic data (including ECG signals, continuous blood pressure waveforms, and respiration). In a real-world monitoring application, these methods can be applied for many purposes, including: robust estimation of parameters such as heart rate, mean arterial pressure, and respiration when the primary signals used to derive these parameters become unavailable or unreliable; detection of changes in patient state, when the relationships between signals remain consistent even as individual signals change their behavior; and recognition of intervals of signal corruption, when a signal becomes inconsistent not only with respect to its previous history but also with respect to its relationships with other signals.

In this Challenge, participants are asked to reconstruct, using any combination of available prior and concurrent information, segments of signals that have been removed from multiparameter recordings of patients in intensive care units (ICUs).