IMAGINE (http://migrate.bch.theopenscholar.com/imagine)

Intelligent Medical Imaging Research Group
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TWITTER (HTTPS://TWITTER.COM/IMAGINEBCH)

Mission and Vision

An embryo's developing brain generates neurons at an astonishing rate of almost half a million per minute from the 4th week of pregnancy until mid-gestation. At this stage, the baby's brain continues to form in the womb, ultimately taking shape as the most complex living organ known. Our collective interest in understanding the relative effects of nature vs. nurture, i.e., genes vs. environment (e.g., parental influence) on brain growth and development of intelligence is long-standing.

At IMAGINE we develop technology and knowledge for in-vivo analysis of normal and abnormal brain development before and early after birth when the brain undergoes its most rapid formative

growth. With a focus on translational technology development for developmental neurology and computational developmental neuroscience, we are interested in understanding the structure and function of the early developing brain, intelligence, and learning, especially when neurodevelopment may be altered by congenital anomalies or adverse perinatal conditions.

Our approach to technology development is inspired by the human's ability in high-level cognitive tasks in particular visual perception and cognition. To this end, we build intelligent imaging technologies upon machine learning and deep learning to improve medical imaging at both acquisition and analysis levels. These technologies aim to 1) improve quality of safe imaging for the most challenging populations (fetuses, newborns, and young children), and 2) enhance radiological image interpretation and analysis for disease diagnosis and evaluation.

The impact of these transformative technologies on medicine cannot be overstated. These techniques will contribute to elucidating the underlying causes of neurodevelopmental disorders in preterm infants and newborns with congenital diseases, potentially leading to prevention, improved therapies, and in some cases, cure. Clinical and radiological decision support systems are now crucial for radiologists, as large, high-resolution, multi-channel 3D and 4D medical images contain information that cannot be inferred through simple 2D visual assessment.

Links:
IMAGINE github page (https://github.com/bchimagine)
Spatiotemoral fetal brain MRI atlas (http://crl.med.harvard.edu/research/fetal_brain_atlas/)
Computational Radiology Laboratory (CRL) (http://crl.med.harvard.edu/)
Research and Innovation at Radiology (http://www.childrenshospital.org/centers-and-services/departments-and-divisions/department-of-radiology/research-and-innovations) and Neurology (http://www.childrenshospital.org/centers-and-services/departments-and-divisions/department-of-neurology/our-innovative-approach) Departments at Boston Children's Hospital (http://www.childrenshospital.org/)
Cardiac Neurodevelopmental Program at Boston Children's Hospital (https://www.childrenshospital.org/programs/cardiac-neurodevelopmental-program)
Maternal Fetal Care Center at Boston Children's Hospital (https://www.childrenshospital.org/programs/maternal-fetal-care-center)
Cardiac Neurodevelopmental Outcome Collaborative (CNOC) (https://cardiacneuro.org/)

(http://crl.med.harvard.edu/)

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