Biomedical image analysis is an important inter-disciplinary research area providing powerful tools to analyze physiological functions, and to examine anatomical artifacts in medicine. To improve the quality of our lives, several well-established companies are developing more reliable and faster imaging systems allowing for accurate assessment of physiological functions. Meanwhile, artificial intelligence (AI) has recently achieved extraordinary success in computer vision, including several applications in biomedical image analysis, where the performance could be improved by orders of magnitudes. In the era of AI, therefore, it is an opportunity to re-think the big picture of biomedical image analysis and how can the problems be re-approached. This motivates us to consolidate high-quality articles describing promising biomedical applications when combining AI and biomedical image analysis within this special issue.

Importantly, advances in AI in biomedical image analysis and related computing methodologies have provided a new paradigm shift to the therapeutic or diagnostic management of diseases and disabilities. Potentially, such biomedical AI systems can provide more accurate health diagnostic systems from a clinical perspective, and can be applied to a wide spectrum of medical fields. As such, state-of-the-art AI based medical image processing and analysis technologies can play a critical role for the advancement of these medical fields.

This special issue focuses on the recent development of AI techniques into applications of biomedical signal processing and image analysis technologies. Its main goal is to provide an overview of the current state-of-the-art advances in how AI revolutionizes biomedical image analysis, and to promote further applications and deeper integration of medical imaging AI systems in engineering, science, and medicine. Potential topics include, but are not limited to:

- Applications of deep learning in fundamental problems, such as 2D/3D biomedical image segmentation and/or registration;
- Applications of AI techniques in processing videos in the biomedical domain, such as surgical guidance, instrumental detections in real-time videos, etc.;
- Applications of reinforcement learning in providing guidance for screening, diagnosis, therapy planning, and treatment follow-ups;
- New algorithms for integrating domain specific human knowledge into AI models to solve biomedical image analysis problems;
• New unsupervised or semi-supervised learning schemes to overcome training data scarcity in biomedical image analysis problems;
• Visualization of deep learning models in the biomedical domain;
• Analysis and processing of image data (such as CT, MRI, SPECT, PET, ultrasound, and echocardiography), as well as AI techniques to integrate this wide spectrum of biomedical data to assist with clinical decision-making and therapy guidance;
• Development of tools for deploying medical imaging AI systems in real applications.

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<table>
<thead>
<tr>
<th>Manuscript Due</th>
<th>1 June 2018</th>
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<tbody>
<tr>
<td>First Round of Reviews</td>
<td>30 June 2018</td>
</tr>
<tr>
<td>First Round of Revised Manuscript Due</td>
<td>16 July 2018</td>
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<tr>
<td>Second Round of Reviews</td>
<td>10 August 2018</td>
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<tr>
<td>Second Round of Revised Manuscript Due</td>
<td>30 August 2018</td>
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<tr>
<td>Final Version of Accepted Manuscript</td>
<td>10 September 2018</td>
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<tr>
<td>Proposed Publication Date</td>
<td>1 October 2018</td>
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