List of recent papers that address the problem of class imbalances in Convoluted Neural Networks (CNN):

1. A Deep Convolutional Neural Network Model to Classify Heartbeats (Acharyaa et al., August 2017)
2. Clinical Text Classification with Rule-based Features and Knowledge-guided Convolutional Neural Networks (Yao et al., July 2018): “identifying ***trigger phrases***, predicting classes with very few examples using trigger phrases and training a convolutional neural network with word embeddings and ***Unified Medical Language System (UMLS) entity embeddings.***”
3. LeGR: Filter Pruning via Learned Global Ranking (Chin et al., April 2019)
4. A systematic study of the class imbalance problem in convolutional neural networks (Buda et al., October 2018). Summarize the main methods:
   1. Oversampling
   2. Undersampling
   3. Thresholding
   4. One-class classification
   5. Cost-sensitive learning
   6. Hybrid method: SMOTE boosting
5. Convolutional Neural Networks for Biomedical Text Classification: Application in Indexing Biomedical Articles (Rios et al., Sep 2015). From their further research directions:
   1. First, we will ***study deeper CNNs utilizing more sophisticated max-pooling procedures***. Dynamic max-pooling methods have been proposed for text classification with CNNs.
6. Cerebral Micro-Bleed Detection Based on the Convolution Neural Network With Rank Based Average Pooling (Wang et al., August 2017): “use different structures of the CNN with ***rank-based average pooling*** to detect the CMB, and compare this method used in this paper to the current state-of-the-art methods.”
7. Deep Learning for Imbalanced Multimedia Data Classification (Yan et al., December 2015): “integration of ***bootstrapping methods***and a state-of-the-art deep learning approach, Convolutional Neural Networks (***CNNs***), with extensive empirical studies.”