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Computational prediction of visual function and treatment effect in retinal diseases

REFERENCE:
551.15, 557.15

COOPERATION OPTIONS:
- Development partnership
- License agreement
- Patent sale or other

IPR:
PCT/EP2016/054249
PCT/EP2016/059877

BACKGROUND

The proposed methodology is an important step towards image-analysis based individualization of patient management and treatment in one of the most cost-intensive fields of modern medicine. We propose to identify and quantify retinal morphology using deep learning algorithms such as convolutional neural networks (CNN) and to predict future disease progression patterns and treatment response in patients based on spatio-temporal signatures.

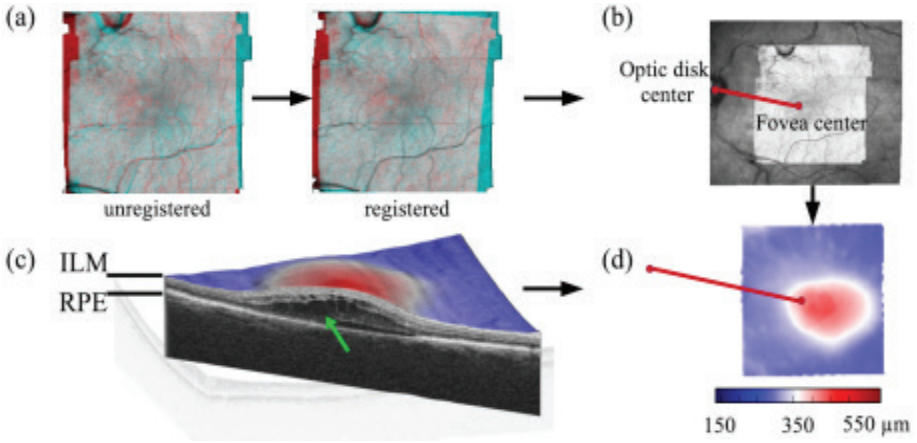

Figure: Steps to get spatio-temporal signatures in a joint reference space. (a) Intra-patient registration via vessel structure. For illustration purpose 2D projections from OCTs of two timepoints are overlayed and colored blue resp. red. (b) Inter-patient alignment via fovea center and optic disk center. (c) Disease features as total retinal thickness maps are obtained by measuring the distance between the ILM layer and RPE layer. The cut through the retina reveals the pathological cystic structure causing edema (green arrow). (d) Transformation of the thickness maps into the reference frame.

ADVANTAGES

- **prediction of treatment response patterns** based on spatio-temporal disease signatures extracted from longitudinal spectral domain optical coherence tomography (SD-OCT) images.
- **prediction of recurrence of edema within twelve months**.
- **prediction of the time to recurrence of edema**.
- **higher classification accuracy than other algorithms by approximately 15%.**

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