

# Identification of Chiasmal Malformations with Deep Learning Anomaly Detection

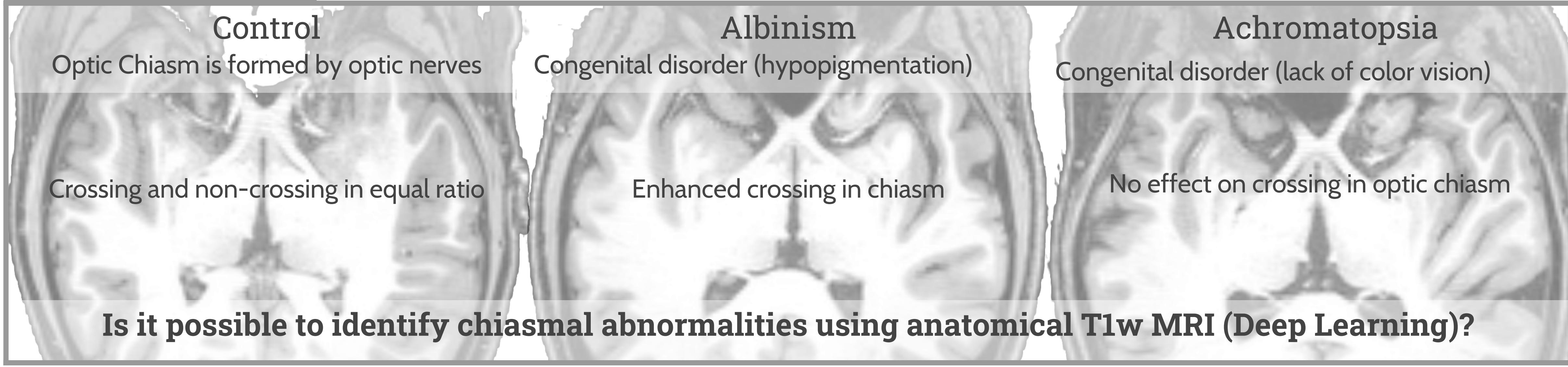
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## Background



Is it possible to identify chiasmal abnormalities using anatomical T1w MRI (Deep Learning)?

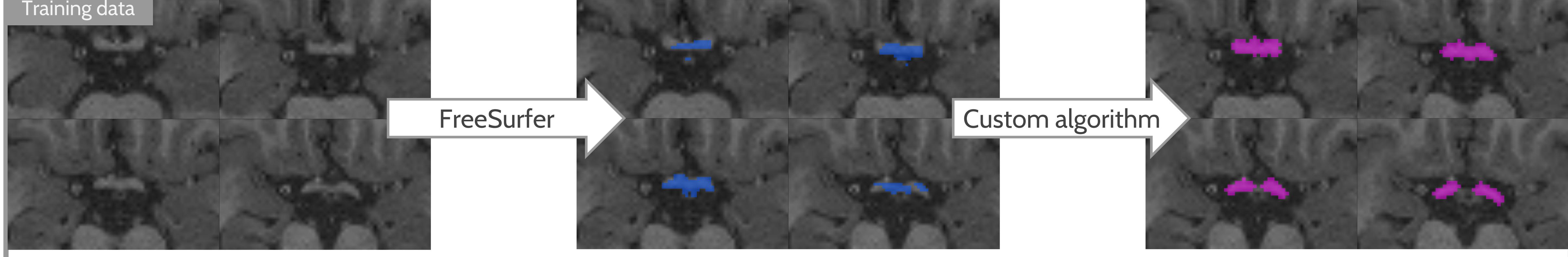
## Methods

### T1w MRI Data

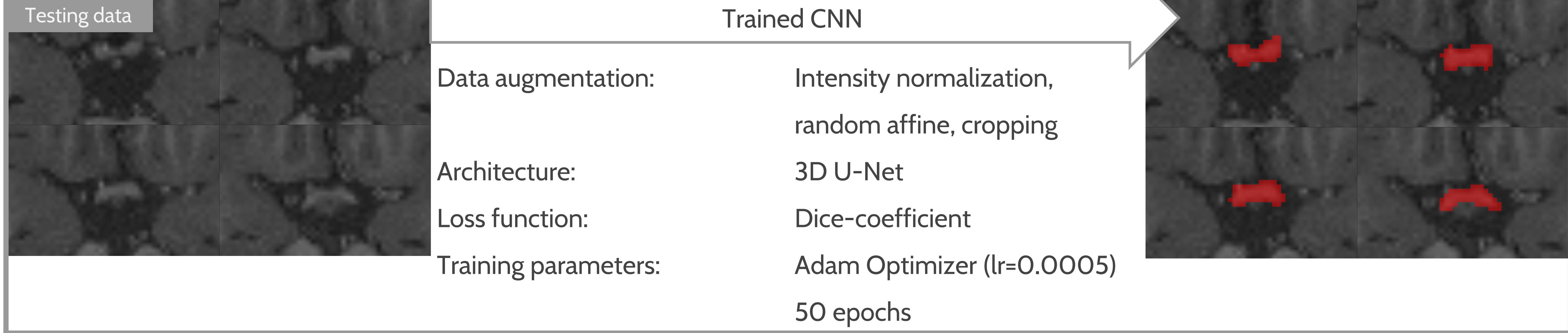
Otto-von-Guericke University (OVGU) data [albinism (n=9), achromatopsia (n=5) and controls (n=8] with hand-drawn chiasm masks

HCP Project control data (n=1065): network training (n=905), training validation (n=100) and training test (n=50)

### Generation of optic chiasm target masks for HCP dataset

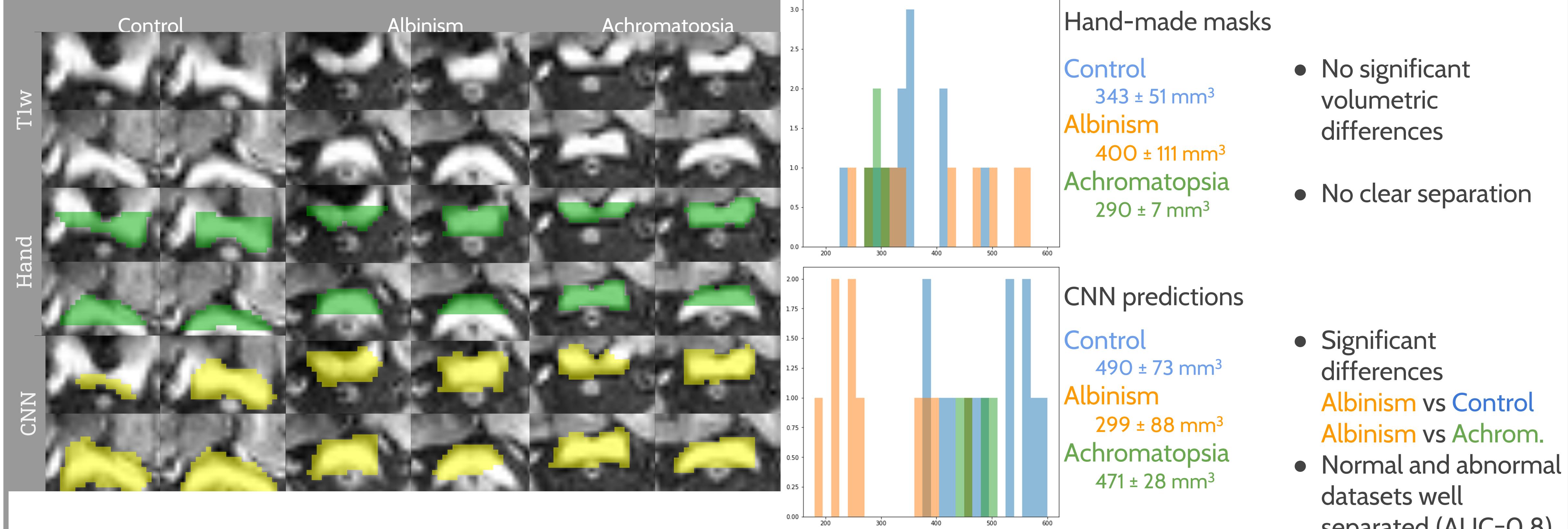


### Convolutional Neural Network (CNN)



## Results

### CNN prediction using OVGU data



## Acknowledgements



European Union's Horizon 2020 research and innovation programme under the Marie Skłodowska-Curie grant agreement No. 641805



German Research Foundation (DFG; HO2002/10-2)

## Conclusions

- Abnormal chiasmal crossing is followed by an abnormal structural pattern
- CNNs are sensitive to this altered pattern
- Proof of concept for CNN-based malformation detection
- Possible diagnostics with T1w MRI and CNNs

## References

- Hoffmann, M. B., & Dumoulin, S. O. (2015). Congenital visual pathway abnormalities: a window onto cortical stability and plasticity. *Trends in neurosciences*
- Schmitz, B., Schaefer, T., Krick, C. M., Reith, W., Backens, M., & Käsmann-Kellner, B. (2003). Configuration of the optic chiasm in humans with albinism as revealed by magnetic resonance imaging. *Investigative ophthalmology & visual science*