**Claims:**

1. A computer-implemented method for diagnosing dementia subtypes in one or more patients, the method comprising:

obtaining brain imaging data relating to the one or more patients; and

classifying the one or more patients between a plurality of classes comprising a first class of patients having the first subtype of dementia and a second class of patients having the second subtype of dementia, by providing the brain imaging data relating to the one or more patients as input to a deep learning model that has been trained using brain imaging data from a plurality of patients, the brain imaging data comprising a first set of images showing evidence of temporo-parietal hypo-metabolism, and a second set of images showing evidence of hypo-metabolism in regions of the brain other than the temporal and parietal regions instead or in addition to the temporal and parietal regions, wherein the first set of images is labelled as associated with a first subtype of dementia and the second set of images is labelled as associated with a second subtype of dementia.

2. The method of claim 1, wherein the subtypes of dementia are subtypes of Alzheimer's disease (AD), wherein the first subtype of dementia is AD, wherein the second subtype of dementia is AD in combination with cerebrovascular disease or vascular dementia, wherein the second type of dementia is cerebrovascular disease or vascular dementia, wherein the second subtype of dementia is mixed AD and/or wherein the second subtype of dementia is not AD.

3. The method of any preceding claim, wherein the classifying is between the first class of patients having the first subtype of dementia and the second class of patients having the second subtype of dementia.

4. The method of any preceding claim, wherein the deep learning model is a deep neural network classifier and/or wherein the deep learning model comprises a convolutional neural network (CNN), wherein the deep learning model comprises a model that has been pretrained on unrelated image data, and/or wherein the deep learning model comprises a CNN that has been pre-trained using a deep residual learning framework.

5. The method of any preceding claims, wherein the deep learning model comprises all layers of a CNN that has been pretrained for image recognition apart from the classification layer, and a classification layer trained using the first and second set of images and associated labels, optionally wherein the classification layer comprises a fully connected layer and a softmax layer.

6. The method of any preceding claim, wherein the images in the first set and the second set show evidence of different metabolic activity in any one or more of, or all of: the right frontal cortex, left frontal cortex, right temporal cortex, left temporal cortex, right parietal cortex, left parietal cortex, left cerebellum and right cerebellum.

7. The method of any preceding claim, wherein the images in the second set of images show evidence of hypo-metabolism in regions of the brain comprising one or more of, or all of: the right frontal cortex, left frontal cortex, left cerebellum and right cerebellum, instead or in addition to one or more of: the right temporal cortex, left temporal cortex, right parietal cortex, and left parietal cortex.

8. The method of any preceding claim, wherein hypo-metabolism refers to a lower glucose uptake rate and/or blood flow and/or FDG-PET derived Standardized Uptake Value Ratio (SUVR) than expected for a control.

9. The method of any preceding claim, wherein the brain imaging data is:

(i) imaging data acquired using any functional brain imaging modality providing information about the metabolic activity of a brain region imaged;

(ii) imaging data acquired using any functional brain imaging modality providing information about the metabolic activity of a brain region imaged, wherein the information about the metabolic activity of a brain region imaged is obtained by detecting glucose uptake by a brain region imaged and/or blood flow to the brain region imaged;

(iii) FDG-PET data or ASL data; and/or

(iv) baseline functional brain imaging data.

10. The method of any preceding claim, wherein analysing the data using a deep learning model comprises analysing a single section of the brain imaging data for each patient and/or wherein the

method comprises selecting a single section of a set of brain imaging data for each patient, optionally wherein the single section is a single axial section at the level of the thalamus and/or wherein the single section is a section including at least part of the hippocampus and entorhinal cortex.

11. The method of any preceding claim, wherein the brain imaging data used to train the deep learning model comprises a single section of a set of brain imaging data for each of the plurality of patients and/or wherein the method comprises selecting a single section of a set of brain imaging data for each of the plurality of patients, optionally wherein the single section is a single axial section at the level of the thalamus and/or wherein the single section is a section including at least part of the hippocampus and entorhinal cortex.

12. The method of any preceding claim, wherein the first set of images comprises one or more images for each of at least 30, at least 40, at least 50, at most 500, at most 200 or at most 100 patients, and/or the second set of images comprises one or more images for each of at least 30, at least 40, at least 50, at most 500, at most 200 or at most 100 patients, and/or the first set of images comprises one or more images for each of a number of patients that is within 10% or within 20% or the number of patients for which one or more images are included in the second set of images, and/or wherein the first and second sets of images comprise one or more images for each of a plurality of patients wherein the plurality of patients for the first and second sets of images are age- and sex-matched.

13. The method of any preceding claim, wherein the first set of images has been labelled as associated with a first subtype of dementia and the second set of images has been labelled as associated with a second subtype of dementia by expert reviewing of the first and second set of images, optionally wherein each image of the first set of images and the second set of images has been assigned the same label by at least two experts.

14. The method of any preceding claim, wherein the brain imaging data used to train the deep learning model comprises images from a plurality of patients and images obtained from images from the images form the plurality of patients by image augmentation, optionally wherein the image augmentation comprises creating a flipped version of one or more of the images and/or creating a randomly rotated version of one or more of the images.

15. The method of any preceding claim, wherein the method further comprises training the deep learning model using brain imaging data from a plurality of patients, the brain imaging data comprising a first set of images showing evidence of temporo-parietal hypo-metabolism, and a second set of images showing evidence of hypo-metabolism in regions of the brain other than the temporal and parietal regions instead or in addition to the temporal and parietal regions, wherein the first set of images is labelled as associated with a first subtype of dementia and the second set of images is labelled as associated with a second subtype of dementia.

16. A method of providing a tool for diagnosing dementia subtypes in one or more patients, the method comprising:

obtaining training image data comprising a first set of images showing evidence of temporo-parietal hypo-metabolism, and a second set of images showing evidence of hypo-metabolism in regions of the brain other than the temporal and parietal regions instead or in addition to the temporal and parietal regions, wherein the first set of images is labelled as associated with a first subtype of dementia and the second set of images is labelled as associated with a second subtype of dementia; and

training a deep learning model to classify a patient between a plurality of classes comprising a first class of patients having the first subtype of dementia and a second class of patients having the second subtype of dementia, using the training image data.

17. A method of selecting a subject that has been diagnosed as having AD or being likely to have AD for participation in a clinical trial, the method comprising:

classifying the subject between a plurality of classes comprising a first class of patients having the first subtype of dementia and a second class of patients having the second subtype of dementia, by providing brain imaging data relating to the subject as input to a deep learning model that has been trained using brain imaging data from a plurality of patients, the brain imaging data comprising a first set of images showing evidence of temporo-parietal hypo-metabolism, and a second set of images showing evidence of hypo-metabolism in regions of the brain other than the temporal and parietal regions instead or in addition to the temporal and parietal regions, wherein the first set of images is labelled as associated with a first subtype of dementia and the second set of images is labelled as associated with a second subtype of dementia; and

selecting or excluding the subject from participation in the clinical trial depending on whether the subject was classified as having a first dementia subtype or a second dementia subtype.

18. A method of providing a prognosis for a subject that has been diagnosed as having AD of being likely to have AD, the method comprising:

classifying the subject between a plurality of classes comprising a first class of patients having the first subtype of dementia and a second class of patients having the second subtype of dementia, by providing brain imaging data relating to the subject as input to a deep learning model that has been trained using brain imaging data from a plurality of patients, the brain imaging data comprising a first set of images showing evidence of temporo-parietal hypo-metabolism, and a second set of images showing evidence of hypo-metabolism in regions of the brain other than the temporal and parietal regions instead or in addition to the temporal and parietal regions, wherein the first set of images is labelled as associated with a first subtype of dementia and the second set of images is labelled as associated with a second subtype of dementia; and

determining a prognosis for the subject based on whether the subject was classified as having a first dementia subtype or a second dementia subtype, optionally wherein determining a prognosis comprises determining that the subject is likely to have a faster rate of cognitive decline if the subject is classified in the second class than if the subject is classified in the first class.

19. A system for diagnosing dementia subtypes and/or providing a tool for diagnosing dementia subtypes, the system comprising: one or more processors and computer readable memory storing instructions that cause the processor to perform the method of any of claims 1 to 18, optionally wherein the system further comprises data acquisition means configured to obtain brain imaging data relating to one or more patients.

20. A non-transitory computer readable storage medium containing machine executable instructions which, when executed on a processor, cause the processor to perform the method of any of claims 1 to 18.