This is a Python code for a Flask web application that predicts the stage of dementia from brain MRI images using a pre-trained convolutional neural network (CNN) model.

Here is a brief explanation of the code:

- The first few lines import the necessary Python libraries for the project, such as Flask for creating web applications, Keras for deep learning models, and NumPy for numerical operations.
- A Flask object is created using the `Flask` class with the name of the application passed as the argument. The name is usually `__name__` which refers to the name of the module in which the code is written.
- A pre-trained CNN model is loaded from the file 'cnn_model.h5' using the `load_model()` function from the Keras library. This model was likely trained on brain MRI images and labeled with different stages of dementia. The `compile` parameter is set to `False` since the model was already compiled during training.
- A function `predict_label()` is defined to preprocess the input image, pass it through the pre-trained model, and return the predicted stage of dementia. This function takes an image file path as input and uses the `image` module from Keras to load and preprocess the image. The preprocessed image is then passed through the pre-trained CNN model using the `predict()` function, and the output is converted to a label using the `argmax()` function. Finally, the label is returned as a string using a dictionary `verbose_name` that maps the predicted label to its descriptive name.
- Flask application routes are defined using the `@app.route()` decorator. Each route maps a URL to a Python function that generates an HTML page. For example, the route `@app.route("/index", methods=['GET', 'POST'])` maps the URL '/index' to the function `main()`, which returns the HTML template 'index.html'. The `methods` parameter specifies the allowed HTTP methods for the route. The `GET` method is used to display the page, and the `POST` method is used to submit the form data.
- The route `@app.route("/submit", methods=['GET', 'POST'])` is used to receive the uploaded image file and pass it to the `predict_label()` function to obtain the predicted stage of dementia. The result is then displayed in the 'prediction.html' template using the `render_template()` function. The file path of the uploaded image is also passed as a parameter to the template for display purposes.
- Finally, the Flask application is run with the `run()` method. If the script is executed directly (i.e., not imported as a module), the `__name__` variable is set to `'__main__'`, and the Flask application is started in debug mode. Debug mode allows errors to be displayed in the browser and provides useful information for debugging the application.