**Design brief**

A design document proposing a system spoken English to written English conversion system that can be continuously matured over the discovery of new speaking styles.

**Understanding the problem**

Deep Networks are expensive to train. The most complex models may take weeks to train. Hence, training the entire model again as new discoveries are found may be an unwise decision. In this case, it would be better if we create a system that matures over discovery of new rules.

**Solution for a comprehensive system**

Transfer Learning:

Transfer learning is the process of training a model on a large-scale dataset and then using that pretrained model to conduct learning for another

Initial layers usually capture small, fine details, and as we go deeper, neural networks try to capture task-specific details. Hence, a base model should be formed for a spoken to written translator system and to make this model mature over time we shall do the following steps:

1. Remove fully connected layers of pretrained base neural network.
2. Add a new fully connected layer that matches the number of classes in the *target* dataset
3. Randomize the weights of the new fully connected layer and freeze all the weights from the pre-trained network
4. Train the network to update the weights of the new fully connected layers.

**Final outcome**

This will avoid training the entire neural network again along with preserving the previous knowledge. In this way, we can reduce the time required to train neural network again and again.

**Limitation**

-We require a pretrained fine-tuned neural network.

-This process will work better if the features are general, that is, suitable to both base and target tasks, instead of being specific to the base task.

**References**

[1] <https://arxiv.org/pdf/1801.06146v4.pdf>

[2]<https://software.intel.com/en-us/articles/part-1-using-transfer-learning-to-introduce-generalization-in-models>