**Question:** Is there anything a recurrent network can do that feedforward network can not?

**Answer:** Yes.

**Question:** Can we directly relate the set of encodable memory patterns to properties of the synaptic matrix?

Yes.

**Question:** What is homotopy type?

Homotopy type refers to the topological properties of a space that are preserved under continuous deformations. Two spaces have the same homotopy type if one can be continuously deformed into the other.

**Question:** Can a network encode any homotopy type?

A network can encode spaces with any prescribed homotopy type, but for purely feedforward networks, the homotopy type is highly restricted.

**Conclusions:**

- It is possible to directly relate topological features of the space of represented stimuli to the synaptic matrix.
- Recurrent networks can represent stimuli with any prescribed homotopy type, while purely feedforward networks can not.

**References:**