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### Dynamic system, Zeta function

My research areas are multi-dimensional symbolic dynamic systems and dynamic Zeta function.

1. Multi-dimensional symbolic dynamic system. Study the patterns generation problems on the plane. Set up the rectangular lattices on plane. Given a set of admissible local patterns and extend the patterns to global patterns on plane. The basic problems are:

- (i) Is there any global pattern on plane for a given set of admissible local patterns?
- (ii) How many global patterns? For example, is the growth of number of global pattern exponentially with respect to the size of lattices?  
(i.e. spatial chaos occurs?)
- (iii) How to compute the spatial entropy?
- (iv) Is there any nature measure to describe the patterns generation problem?
- (v) The probability to associate the local patterns which are located on different sites of plane. When the association is mixing or strong mixing?

2. Dynamic Zeta function:

Pick up the periodic patterns of the patterns generation problem to formulate a Zeta function. The Zeta function is an infinite product of rational functions, a meromorphic function on complex plane. The basic problems are:

- (i) The relation between the spatial entropy and natural boundary of Zeta function.
- (ii) The possible application of dynamic Zeta function to algebra or number theory.