Geometric (discrete) controllability for control-affine systems

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Controllability of control systems has been widely studied due to the difficulty to be determined for control systems. In fact, it has been identified as a NP-problem [1]. In this talk we will focus on control-affine systems and describe some approaches to characterize local controllability for some families of control systems, both in the continuous [2] and the discrete setting [3], using some particular families of vector fields.

References:

[1] Agrachev, Andrei A. Is it possible to recognize local controllability in a finite number of differentiations? *Open problems in mathematical systems and control theory*, 1518, Comm. Control Engrg. Ser., Springer, London, 1999.

[2] Barbero-Liñán, M. Characterization of accessibility for affine connection control systems at some points with nonzero velocity, *Proceedings of 50th IEEE Conference on Conference on Decision and Control and European Control Conference (CDC-ECC)*, 2011, 6528–6533.

[3] Barbero-Liñán, M.; Jakubczyk, B. Second order conditions for optimality and local controllability of discrete-time systems. *SIAM J. Control Optim.* 53 (2015), no. 1, 352-377.