Learning to play the violin through different paradigms

Chantal & Alyssa

Supervised Learning

To learn to play the violin through supervised learning the data that would be used to teach you would have to be accurate, explained and labelled. Music theory would be a necessary foundation for learning to play, such as the notes, scales, chord progressions, keys and their accidentals, intervals, dynamics, articulations etc. It would include having a teacher or mentor who provides structured lessons with clear examples of correct technique and sound.

The teacher would guide the player step by step, ensuring that they fully understand each new concept before moving on to the next and would also demonstrate the differences between correct and incorrect playing , helping to recognize mistakes through comparison. Additional aspects such as posture, bowing movements, finger-placements and rhythm would have to be supervised, checked through the teacher or supervisor in real time and offer adjustments and corrections. This hands-on feedback allows the player to build proper muscle memory, improving consistency and precision over time while practicing repetitive exercises under supervision to refine their abilities and knowledge, increasing difficulty as they improve.

Once the player has learned all the basics they can utilize that knowledge for learning to play new songs, generalizing what they've learned. If the player is taught all the fundamental techniques to playing the violin, they will be able to apply their knowledge to new songs and concepts and continue to receive input and feedback through the teacher, reevaluating their abilities as they go.

Reinforcement Learning

When learning to play the violin through Reinforcement Learning actions and states would be the aspects of playing the instrument, such as finger and bow placements, posture and instrument position and the sound being created, including pitch, tempo, note progression etc. The player will learn what works through recognizing the proper tones, melodies and all in all whether or not the notes being played will "sound good" or correspond to the part that should be played.

As such the equivalent of reward and punishment will be the resulting feedback, in this case the sound: if it sounds good, as expected or accurate to the piece being played, or bad, squeaky, off pitch or different from the intended melodies. They would have to listen critically to their own played music and compare the results to the goal. Using these results the player will be able to judge what finger placements, hand movements, bow pressure etc. produce the "correct" results and can through this learn how to properly play the instrument to get the right sound.

In this scenario exploration would be trying new techniques, movements, positions and placements to find ways to play the intended results "better" or "easier" and navigate difficult parts more effectively through trial and error, weeding out the attempts where certain techniques don't bring any useful results and further developing and learning the ones that seem to work. The equivalent of exploitation while learning to play the violin would be whenever the player uses the methods that have already worked, produced the right results and that they are familiar with, further developing these techniques while continuously applying them.

Unsupervised or Self-Supervised Learning

Because the input data would be unlabeled, the player could use recordings of others or later themselves playing and try to analyze what is happening through listening, as well as simply playing by themselves and listening to that. Additionally, learning to play new pieces would be easier with songs whose sound they are already familiar with, allowing them to draw connections between the theoretical aspects and what they can hear and need to play.

Over time, they can start to predict what note or phrase might come next, identify missing notes by analyzing those around them, group similar sounding parts, or detect repeated motifs and where they are applied and compare them to what was previously learned and what they themselves are playing in order to improve both their musical hearing and playing techniques.

When listening to the data, recognizing patterns and reemerging themes can help the player categorize elements that would have been learned through actual theory, such as rhythms, dynamics, articulations, and scales. By repeatedly exposing themselves to different music, the player begins to pick up on how certain note patterns, progressions, and stylistic choices are used in music. As the player continues listening and playing along, they can experiment with mimicking what they hear by making adjustments in bow pressure, timing, placements etc. to match the tone of the recording. This would enable them to develop a deeper connection between sound and technique without direct supervision or labeled data.