Let us consider the following fuzzy chance-constrained programming,

$$\begin{cases} \max \overline{f} \\ \text{subject to:} \\ \qquad \mathrm{Cr}\left\{\sqrt{x_1+\xi_1}+\sqrt{x_2+\xi_2}+\sqrt{x_3+\xi_3} \ge \overline{f}\right\} \ge 0.9 \\ \qquad \mathrm{Cr}\left\{\sqrt{(x_1+\xi_1)^2+(x_2+\xi_2)^2+(x_3+\xi_3)^2} \le 6\right\} \ge 0.8 \\ \qquad x_1, x_2, x_3 \ge 0 \end{cases} \tag{1}$$

where $\xi_1, \xi_2$ and $\xi_3$ are assumed to triangular fuzzy variables $(0,1,2)$, $(1,2,3)$ and $(2,3,4)$, respectively.

In order to solve this model, we generate training input-output data for the uncertain function $U : (\boldsymbol{x}) \to (U_1(\boldsymbol{x}), U_2(\boldsymbol{x}))$, where

$$\begin{aligned} U_1(\boldsymbol{x}) &= \max\left\{\overline{f} \mid \mathrm{Cr}\left\{\sqrt{x_1+\xi_1}+\sqrt{x_2+\xi_2}+\sqrt{x_3+\xi_3} \ge \overline{f}\right\} \ge 0.9\right\}, \\ U_2(\boldsymbol{x}) &= \mathrm{Cr}\left\{\sqrt{(x_1+\xi_1)^2+(x_2+\xi_2)^2+(x_3+\xi_3)^2} \le 6\right\}. \end{aligned}$$

Then we train an NN (3 input neurons, 6 hidden neurons, 2 output neurons) to approximate the uncertain function $U$. Finally, we integrate the trained NN and GA to produce a hybrid intelligent algorithm.

A run of the hybrid intelligent algorithm (6000 cycles in simulation, 2000 training data in NN, 1500 generations in GA) shows that the optimal solution is

$$(x_1^*, x_2^*, x_3^*) = (1.9780, 0.6190, 0.0000)$$

with objective value $\overline{f}^* = 5.01$.