COMMENTS FOR THE AUTHOR:

Dear Authors,

Thank you for the revised submission.

The reviews are now complete and can be found in full below. Based on these the guest editors have decided to conditionally accept your paper subject to *minor revisions*. The revised version will no longer be sent to reviewers. Please also submit all camera ready materials with the 2nd revision.

We thank the authors for their efforts to clarify the main claims and technical details presented in the paper. This has substantially improved the manuscript.

Before the paper can be published, we ask for the following:

- Address comments and suggestions by reviewers #1 and #3. These mainly concern polishing some details and other small questions.

- Please *discuss* the paper mentioned by reviewer #2. Of course if you think a comparison study can be added without substantial amounts of additional work, you are more than welcome to do so. But this is not a strict requirement at this point.

Sincerely,

ECMLPKDD 2019 Journal Track Chairs,
Karsten Borgwardt
Po-Ling Loh
Evimaria Terzi
Antti Ukkonen

Reviewer #1: On page 3, line 30-32, you state that a matrix factorization decomposes a matrix into the product of two low-rank matrices. This is inaccurate, since in a factorization A = V W', V (m x r) and W (n x r) are tall matrices that usually have full rank, i.e., rank equal to r. By saying that V (or W) has "low rank," one thinks that its rank k satisfies k << min(r, m), but this is not the case.

On page 6, line 32 you are using nonstandard mathematics. F = V W' + t, where all but t are matrices is a malformed expression. You should write t 1', where 1 is a column vector of ones of length U.

On page 8, line 13, Pi should be P_i. Happens twice.

Reviewer #2: The authors have addressed most of my comments. However, the authors related their setting to matrix factorization and argued those methods cannot handle feature information. Indeed, this setting is referred to as matrix factorization with side information. There are many papers published in this direction. One of state-of-the-art method is DropoutNet: Addressing Cold Start

in Recommender Systems, NIPS 2017, which can directly apply to the current setting. I suggest the authors should empirically compare with this.

Reviewer #3: A huge improvement over original submission! Exposition is now a lot clearer.

Can you set sigma to zero in equation (3) given that you introduce noise Q for y given cdf in equation (7)? Is there
a link to be fleshed out between sigma and Q (perhaps ease of implementation)?

p6, line 30: to ease reading and link with previous text perhaps state that $F_{nu}=f(x_n,u)$.

p7, line 12: perhaps use "not necessary to optimise the value of C by hand".

p9, line 7: clarify meaning of '[i=a]'. Does this mean [i=a]=1 when i=a?

p9, line 28: instead of "remains intractable", perhaps "scales poorly".

p9, line 32: perhaps remind reader of meaning of theta: "we omit the kernel hyper parameters \theta".

p12, as pdf is a function of f which is a function of \nu, w and t, equations 22, 23 and 24 should have expectations of log
normal evidence (first term on right hand side). For example, in 22 should be expectation over t and w.

p13, Table 1: what is the 'test #scores' (not defined in text)? Why are there no test pairs for the simulated experiments?

p15, line 27: what do you mean by 'not use the sparse inducing point approximation'. Are you using all the points or, for example,
only using randomly determined inducing points?

p18, Figure 3: please enlarge both sub-figures.

p18, line 25: use 'ELBO' or 'variational lower bound' instead of L.
p18, line 27: state 'more than 2 items' instead of 'k items'.

Please check git hub code on fresh installation as there are bugs. For example, in 'cycles_demo.py' you attempt to
import GPPrefLearning from gp_pref_learning before including models folder in path.

Typos:

p3, line 36: 'rankings' to 'ranking'.
p6, line 1: change to y_p=y(x_{a_p},x_{b_p}).
p6, line 25: delete first 'items'.
p8, line 12: should be subscript i in O expressions.
p9, line 7: hat over z in pdf.
p17, line 50: delete one 'is'.