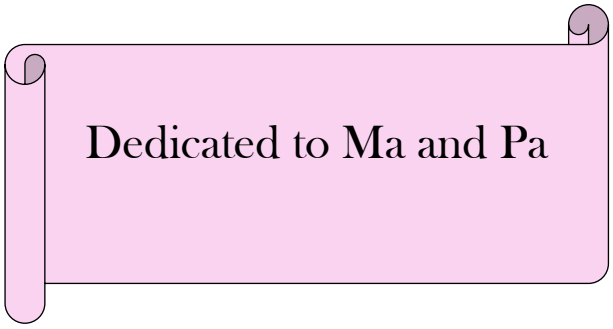
I know what it is to be in need, and I know what it is to have plenty. I have learned the secret of being content in any and every situation, whether well fed or hungry, whether living in plenty or in want.
I can do everything through him who gives me strength.



Declaration by the candidate

The candidate certifies that the thesis entitled **"Computational gastronomic study on flavour pairing behaviour in food recipes"** submitted to the **School of Engineering, Tezpur University** in partial fulfilment for the award of the degree of **Doctor of Philosophy** in the **Department of Food Engineering and Technology** is a record of research work carried out by me under the supervision of **Prof. Manuj Kumar Hazarika**.

All assistance received from various sources have been appropriately acknowledged. No part of this thesis has been submitted elsewhere for the award of any degree.

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कुलाध्यक्ष का सर्वोत्तम विश्वविद्यालय पुरस्कार, २०१६
Visitor's Best University Award 2016

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Dated: …/…../……..

Certificate from the Supervisor

This is to certify that the thesis entitled **"Computational gastronomic study on flavour pairing behaviour in food recipes"** submitted to the **School of Engineering, Tezpur University** in partial fulfillment for the award of the degree of **Doctor of Philosophy** in the **Department of Food Engineering and Technology** is a record of research work carried out by **Ms. L.V. Makinei** under my supervision and guidance.

All assistance received by the candidate from various sources has been appropriately acknowledged. No part of this thesis has been submitted elsewhere for award of any other degree.

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Acknowledgements

First and foremost, I thank God for His grace and mercy that have led me to this very moment.

With deep gratitude, I would like to express my sincere thanks to my supervisor Prof. Manuj Kumar Hazarika. It is because of his help, time and academic guidance that I have been able to complete my research work. It has been a great experience to work under him.

I would like to thank my Doctoral Committee members, Prof. Manabendra Mandal and Prof. Poonam Mishra for their encouragement, and valuable suggestions at various stages of my research. I also thank the Doctoral research committee members for their insightful comment and guidance throughout my research work. I also acknowledge the entire faculties, technical officer, technician, office staff of Department of Food Engineering and Technology for their constant help and support.

I would also like to acknowledge the financial support from University Grants Commission (UGC NET-JRF) for supporting me throughout my research.

I express my sincere thanks to my lab junior Ms. Shagufta Rizwana for her constant help and support throughout my research work. I also thank my lab mates Swapnil Gautam, Tridisha Bordoloi, Sonam Kumari and my Juniors for their motivation and encouragement. Also, a special shout out to my friend Dr. Chiging Yamang for being my confidante.

I would like to express my gratitude to my Parents for their constant emotional support and for believing in me. My siblings, Lamak, Noel, Samzeila and Apollos for supporting me always. My relatives, uncles, aunts, cousins, and friends for all their prayers, support, interest, motivation and encouragement to persevere through the difficult times of my research. A special thanks to my cousin brothers Mr. Rejoyson Thangal and Dr. Moses who helped me in their own special ways.

Finally, I express my thanks to all whose names have not been mentioned individually but have helped me directly or indirectly in this work.

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List of Notations and Abbreviation

χ_i	The contribution of i^{th} ingredient in a cuisine
k	Number of recipes
s	The number of ingredients in a recipe
t-SNE	t-Distributed Stochastic Neighbour Embedding
C	Any given cuisine
CSV	Comma-separated value, format for tabulated data
NMF	Non-negative matrix factorization
R	Represent a recipe
RLS	Recursive least squares
TF-IDF	Term frequency inverse document frequency
TSV	Tab-separated value, format for tabulated data
F_i	Set of flavour compounds found in the ingredient i
F_j	Set of flavour compounds found in the ingredient j
N_c	Number of recipes in the cuisine C
$\bar{N}_s$	The average number of shared flavouring compounds at cuisine level
$N_s(R)$	The average number of shared flavouring compounds at recipe level
$\bar{N}_s^{Real}$	$\bar{N}_s$ values of a real cuisine
$\bar{N}_s^{Rand}$	$\bar{N}_s$ values of a random cuisine
ΔN_S	The difference between the average number of shared flavouring compounds of the real cuisine and a random cuisine
$\bar{N}_s(C)$	The degree of the flavour pairing of a given cuisine C
$\bar{N}_s(C^i)$	The degree of the flavour pairing of the cuisine C after the exclusion of ingredient of concern i
p_i^C	Authenticity of an ingredient ***i*** in cuisine C
p_{ij}^C	Authenticity of an ingredient pair ***i,j*** in cuisine C
p_{ijk}^C	Authenticity of an ingredient triplet ***i,j,k*** in cuisine C
$P_I(k)$	Probability distribution of ingredients appearing in k recipes
$P_c(k)$	Complementary cumulative degree distribution
P_i^C	Prevalence of ingredient ***i*** in cuisine C